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ABSTRACT

This briefing package consists of a compilation of over 15 papers, fact sheets, and other materials focusing on the use of acid-free papers in books and other publications. The document contains the following: Executive Summary and List of Contents; Some Frequently Asked Questions; "Paper Preservation in Library Collections: Basic Information. Terminology"; "Preservation of Libraries and Archives" (C. J. Shahani and W. K. Wilson), American Scientist, May/June 1987, p. 240-251; "U.S. Promotes the Manufacture and Use of Permanent Paper," International Preservation News, January 1988, p. 1-3; "Why GPO Should Use Alkaline Paper" (L. Nainis, and others), Documents to the People, March 1988, p. 38-41; "The Use of Permanent Paper for Biomedical Literature," National Library of Medicine; "American Library Association (ALA) Resolution on Use of Permanent Paper in Books and Other Publications"; Alkaline Papermaking at Simpson-Plainwell Paper Co. (G. Lawton), Alkaline Paper Advocate, October 1988, p. 36-40; "Manufacturers of Permanent Paper" and "Companies Making Alkaline or Neutral Paper"; "Making Books That Will Last, A Call for Authors To Join the Campaign for Acid-Free Paper (B. Goldsmith), Authors Guild Bulletin, Winter 1988, p. 34-35; "AAUP Members Firmly Committed to Permanent Paper"; "To Establish a National Policy on Permanent Paper" (S.J. Res. 57), February 8, 1989; Congressional Record Articles on S.J. Res. 57; "Report and Recommendations to the General Assembly from the Committee on Alkaline Paper of the Connecticut Preservation Task Force" (Connecticut State Library); and Miscellaneous Fact Sheets (Association of Research Libraries, National Humanities Alliance, Commission on Preservation and Access). (CGD)

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Preserving Knowledge: The Case for Alkaline Paper

Association of Research Libraries
Commission on Preservation and Access
National Humanities Alliance

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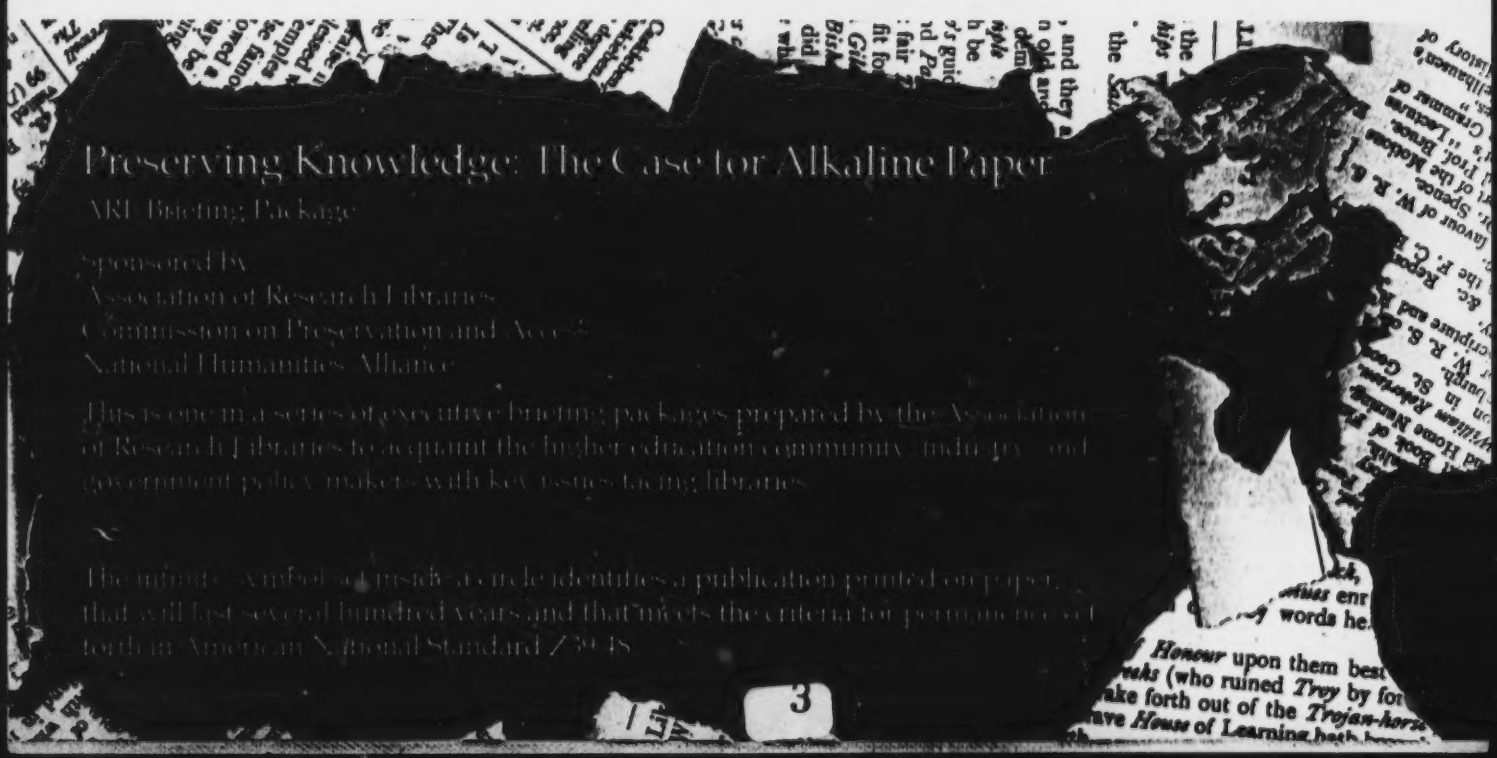

Preserving Knowledge: The Case for Alkaline Paper

ARL Briefing Package

Sponsored by
Association of Research Libraries
Commission on Preservation and Access
National Humanities Alliance

This is one in a series of executive briefing packages prepared by the Association of Research Libraries to acquaint the higher education community, industry, and government policy makers with key issues facing libraries.

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PRESERVING KNOWLEDGE: THE CASE FOR ALKALINE PAPER

ARL Briefing Package Number 3
November 1988

Sponsored by:

Association of Research Libraries
Commission on Preservation and Access
National Humanities Alliance

EXECUTIVE SUMMARY

Nearly 80 million books in North American research libraries are threatened with destruction because they are printed on acidic paper. Surveys confirm, in effect, that "slow fires," triggered by the acids in paper, are spreading through most research libraries, transforming book and journal collections into piles of paper fragments.

The catastrophic implication for scholarship and for society is the loss of significant portions of distinctive research collections representing the world's intellectual heritage. At the heart of the case for using alkaline paper for publications is a social and moral imperative to preserve knowledge for the future.

The most cost-effective solution to this problem is to discontinue use of acidic paper for book production and to use instead alkaline, durable paper. The justification for this strategy is quite simple: printing books on alkaline paper eliminates the problem at its source. Publications produced on acid-free paper will last for centuries rather than decades. Use of alkaline paper in publishing will have a more direct impact on preserving knowledge than any other single effort.

Possibly the greatest barriers to the use of alkaline paper for publishing are lack of awareness of the problem of acidic paper and/or misperceptions about the availability and price of alkaline paper. The magnitude of the problem requires an accelerated collaborative effort among leaders in the library community, academic institutions, publishing industry, paper industry, as well as concerned scholars, authors, and others to make the case for alkaline paper.

This briefing package was compiled by the Association of Research Libraries (ARL) and co-sponsored by the Commission on Preservation and Access and the National Humanities Alliance to provide information in support of the use of alkaline paper for publications.

A list of the contents of ARL Briefing Package Number 3 appears on the reverse of this executive summary.

LIST OF CONTENTS

Overview and Background

"Preserving Knowledge: The Case for Alkaline Paper. Some Frequently Asked Questions," ARL, November 1988.

"Paper Preservation in Library Collections: Basic Information," ARL, November 1988.

"Preservation of Libraries and Archives," by Chandru J. Shahani and William K. Wilson. *American Scientist*, May/June 1987, p. 240-251.

"U.S. Promotes the Manufacture and Use of Permanent Paper." *International Preservation News*, January 1988, p. 1-3.

"Why GPO Should Use Alkaline Paper," by Linda Nainis et al. *Documents to the People*, March 1988, p. 38-41.

"The Use of Permanent Paper for Biomedical Literature," National Library of Medicine, February 1988.

"Resolution on Use of Permanent Papers in Books and Other Publications." Adopted by the Council of the American Library Association, San Antonio, Texas, January 13, 1988.

Paper Industry Update

"Alkaline Papermaking at Simpson-Plainwell Paper Co.," by George Lawton. *Alkaline Paper Advocate*, October 1988, v. 1, no. 3, p. 36-40.

"Major Paper Manufacturers' Prices for Acidic vs. Acid-Free Papers in Selected Paper Grades," by Guy Dresser. *Alkaline Paper Advocate*, May 1988, v. 1, no. 3, p. 20.

"Manufacturers of Permanent Paper," National Information Standards Organization, September 1988.

Author and Publisher Support

"Making Books That Will Last. A Call for Authors to Join the Campaign for Acid-Free Paper," by Barbara Goldsmith. *The Authors Guild Bulletin*, winter 1988, p. 34-35.

"Making Books That Will Last: The Campaign for Acid-Free Paper Gains Widespread Support," by Barbara Goldsmith. To be published in *The Authors Guild Bulletin*, Fall 1988.

"AAUP Members Firmly Committed to Permanent Paper," ARL/OMS, November 1988.

Government Response

"U.S. Congress, Senate, Joint Resolution to Establish a National Policy on Permanent Paper," 100th Congress, 2d Session, October 11, 1988.

"Statement by Senator Clairborne Pell (D-RI) on Introducing Senate Joint Resolution to Establish a National Policy on Permanent Papers." *Congressional Record*, 100th Congress, 2d Session, Senate, Tuesday, October 11, 1988.

Also enclosed are fact sheets from the sponsors of this Briefing Package: the Association of Research Libraries, the Commission on Preservation and Access, and the National Humanities Alliance.

January 1989

Association of Research Libraries
1527 New Hampshire Avenue, N.W., Washington, D.C. 20036 (202) 232-2466

PRESERVING KNOWLEDGE: THE CASE FOR ALKALINE PAPER

Some Frequently Asked Questions

What is the problem?

Nearly 80 million books in North American research libraries are threatened with destruction because they are printed on acidic paper. Surveys confirm, in effect, that "slow fires," triggered by the acids in paper, are spreading through most research libraries, transforming book and journal collections into piles of paper fragments.

Acidic paper disintegrates because wood pulp contains acid impurities, and producers use additional acid chemicals to improve the printing characteristics of the paper. Over time these acids destroy cellulose fibers, causing paper to become brittle, darkened, and weak. The problem is compounded by air pollution, improper storage conditions, poor binding methods, and heavy or careless use. The primary cause of a book's disintegration, however, is the acidity of the paper on which it is printed.

What are the implications of the problem?

The catastrophic implication for scholarship and for society is the loss of significant portions of distinctive research collections representing the world's intellectual heritage. At the heart of the case for using alkaline paper for publications is a social and moral imperative to preserve knowledge for the future.

What is the solution?

The most cost-effective solution is to discontinue use of acidic paper for book production and to use instead alkaline, durable paper. The justification for this strategy is quite simple: printing books on alkaline paper eliminates the problem at its source. Publications produced on acid-free paper will last for centuries rather than decades. Use of alkaline paper in publishing will have a more direct impact on preserving knowledge than any other single effort.

What are the barriers to the use of alkaline paper?

Possibly the greatest barriers to the use of alkaline paper for publishing are lack of awareness of the problem of acidic paper and/or misperceptions about the availability and price of alkaline paper. In addition, paper producers face the costs of converting their mills in order to produce alkaline paper. However, even this barrier is dissolving as it has been demonstrated that once a mill is converted, manufacturing costs can be less than for acidic paper.

What are the dimensions of the problem?

The problem began in the mid-19th century when, as a result of growing literacy and publishing, the increased demand for paper forced manufacturers to use more plentiful wood pulp instead of cloth rags in paper production. Books printed after 1850 are in the most immediate danger.

Already, at least one-fourth of the collections of most major university and research libraries in the United States and Canada are in some stage of serious embrittlement—that is, the paper breaks as the book is used. The Library of Congress estimates that over 3 million books in its collection are already brittle and that each year an additional 77,000 books enter the endangered category. The problem is not restricted to the Library of Congress or just a few large research collections. The same pattern of serious, advancing deterioration is found in many libraries with collections of materials published during the last century.

What does it take to save books already printed on acidic paper?

To preserve books already printed on acidic paper, librarians pursue several strategies depending on the condition of the book: for books already brittle, transferring the text from paper onto other media such as archival microfilm or optical disk; for books not yet brittle, treating books with processes that remove acid and strengthen the paper; for all books, improving environmental conditions for collections; and for some special materials, providing a wide range of conservation treatments. Depending on the treatment, the estimated costs of saving an acidic volume varies. Capturing the content of a brittle book on archival film costs from $60 to $100 per volume; deacidifying the book before it becomes brittle costs about $10 per volume.

Given the enormous amount of research materials in need of preservation, the cumulative dollar cost of saving deteriorating material is staggering. These costs, borne by public and private universities, the Federal Government, and some private foundations, cannot and should not be sustained indefinitely when a more cost-effective solution is at hand: stop publishing books on acidic paper.

What kind of paper do publishers use for books now?

It varies. American university presses use durable, alkaline paper for printing the major portion of their publications. However, with some notable exceptions, U.S. trade books and serials, and publications of the Federal and State governments, continue to be printed on acidic paper. A similar picture exists around the world.

What is the availability of alkaline paper?

Within the last two years, the production of alkaline paper in the U.S. has increased steadily and is characterized by the paper industry as "snowballing." More than 30 paper mills now produce alkaline paper. The paper industry forecasts a doubling of capacity over the next two years as several major paper manufacturers shift to alkaline production.

Is alkaline paper more expensive than acidic paper?

No. A recent survey of major paper manufacturers' prices in selected paper grades reveals that prices for acid-free, alkaline paper are comparable to those for acidic paper. (See "Major Paper Manufacturers' Prices for Acidic vs. Acid-Free Papers in Selected Paper Grades," *Alkaline Paper Advocate*, May 1988, 1:3, p. 20.)

What is the environmental impact of alkaline paper?

There is a significant, beneficial environmental impact since alkaline paper mills produce less pollution than acid paper mills. In the alkaline papermaking process, the elimination of use of aluminum rosinate permits tighter closure of the papermill water system, thereby less effluent is released into the environment. On another front, the process of biological decomposition of alkaline paper is comparable to that of acidic paper so there is no impact on solid waste disposal processes.

Can alkaline paper be made from recycled fibers?

Yes, as long as the paper being recycled is not more than 10% groundwood. At present two paper mills are known to produce alkaline paper from recycled fibers.

What are the incentives for alkaline papermaking?

The major incentives for paper mill conversions from acidic to alkaline paper are the potential for lowered manufacturing costs and positive anti-pollution characteristics. Three advantages are of special importance: use of calcium carbonate as a filler instead of more costly fiber; reduced water consumption in the manufacturing process; and improved waste management. From the standpoint of paper properties, calcium carbonate imparts a higher opacity and brightness to paper.

What steps have been taken to promote the use of alkaline paper?

Considerable progress has been made in promoting the use of alkaline paper. Many organizations have played a role in raising the level of understanding about the problem and have built the base for promoting use of alkaline paper. The Federal Government—especially through Congressional hearings, the Library of Congress, the National Library of Medicine, and the National Endowment for the Humanities—has played an important part in taking leadership and influencing papermaking and publishing. The Council on Library Resources and the Commission on Preservation and Access have made a significant contribution to publicizing and shaping the agenda for a national preservation strategy. The Association of Research Libraries, the National Humanities Alliance, other organizations, and concerned individuals have broadened awareness of the problem and expanded the base of support for the use of alkaline paper. University presses have led the way by using alkaline paper in most of their publications. Two major trade publishers—Random House and Simon & Schuster—have announced that all first printings of hardcover books will be on acid-free paper.

Several specific actions have been taken to focus attention on the alkaline paper issue:

- The Depository Library Council to the Public Printer in October 1987 adopted a resolution urging that alkaline paper be used for U.S. Government documents of enduring value; the first title to be issued on alkaline paper is the *Biographical Directory of the U.S. Congress.*

- The U.S. Joint Committee on Printing, the Congressional oversight committee for the Government Printing Office in May 1988 issued specifications for uncoated permanent printing paper. This is an important step toward making alkaline paper available to government agencies and advocating its use for government publications.

- The Board of Regents of the National Library of Medicine in February 1987 adopted a policy of actively encouraging the production of biomedical literature on permanent paper. A special task force is developing strategies for implementing this policy.

- The National Information Standards Organization (NISO) has distributed an information package about the standard for permanent paper (Z39.48-1984) to 2,400 U.S. publishers. NISO is currently revising the 1984 standard to include coated paper, and maintains a list of Manufacturers of Permanent Paper.

- The American Library Association at its 1988 Midwinter meeting adopted a resolution urging use of permanent papers in books and other publications.

- The Connecticut General Assembly in 1988 became the first state legislature to adopt a resolution supporting the use of alkaline paper for the printing of all State publications.

- The Technical Association of the Pulp and Paper Industry (TAPPI) sponsored in October 1988 the first Paper Preservation Symposium, during which participants expressed considerable support for mill conversion to alkaline paper production.

- The New York Public Library in October 1988 established the NYPL Center for Paper Permanency to serve as a clearinghouse for information about ongoing efforts related to advocating the use of alkaline paper.

- A committee of Authors and Publishers in Support of Preservation of the Printed Word was established at the New York Public Library in October 1988. This group, co-chaired by Barbara Goldsmith and Vartan Gregorian, solicits commitments from authors and publishers to put first printings on alkaline paper.

- Senator Claiborne Pell (D-RI) introduced a Senate Joint Resolution (SJR 394) for a "National Policy on Permanent Papers" on October 11, 1988, and has indicated his intention to pursue similar legislation in the 101st Congress.

What more needs to be done?

The magnitude of the problem requires an accelerated collaborative effort among leaders in the library community, academic institutions, the publishing industry, the paper industry, and government, as well as concerned scholars, authors, and others. The legislation pursued by Senator Pell provides a visible point of departure for more vigorous efforts to increase the use of alkaline paper in book production.

Paper Preservation in Library Collections: Basic Information

TERMINOLOGY

Acidic Paper

Acids are the primary cause of the deterioration of paper. Beginning in the mid-1800s, the use of groundwood and alum-rosin sizing introduced residual acids into the paper manufacturing process. Over time these acids destroy cellulose fibers, causing paper to become brittle, darkened, and weak. Eventually the pages cannot be turned without breaking, and the useful life of the book ends.

Most acidic book papers have a pH of around 5.5 or lower. The pH levels indicate acidity and alkalinity on a numerical scale from 0 to 14, in which 7 is neutral. Books with a pH of 6 are 10 times more acid than books with a pH of 7.

Alkaline Paper

Paper produced with alkaline-based chemistry is "acid-free," having a pH of 7.5 or greater. Under proper storage conditions, such paper will remain strong and supple for hundreds of years. While alkaline, "permanent paper" does not last forever, it will last several hundred years, as compared to several decades for acidic paper. It is sometimes referred to as long-lasting paper.

The Standard for Permanence

An American National Standard specifies the characteristics of permanent, uncoated paper as "paper that should last at least several hundred years without significant deterioration under normal library use and storage conditions." It is published as *Permanence of Paper for Printed Library Materials* (uncoated) ANSI Z.39.48 - 1984 (New York: American National Standards Institute, 1985).

Minimum requirements: alkaline pH of 7.5; alkaline reserve of 2% as a buffering agent; suggested values for tear resistance and folding endurance to insure durability; and pulp free of groundwood.

The National Information Standards Organization has established a committee to revise the 1984 standard for permanent paper to add specifications for coated paper. Coated paper has a smooth surface essential to printing high quality half-tone illustrations. Although the coatings used by paper makers are generally alkaline, the core paper can be alkaline, neutral or acidic.

Durability

Durable paper has high initial strength and resists wear and tear. While folding endurance and tear resistance are not directly related to paper permanence—that is, its chemical stability—they are included in the standard to ensure reasonable durability of the finished paper.

Identification of Paper

The standard for permanent paper suggests that a statement noting compliance with the American National Standard Z39.48-1984 appear on the verso of the title page of a book and in the masthead or copyright area for periodicals, with a logo consisting of a circle surrounding an infinity symbol. ⊗

Paper Preservation in Library Collections: Basic Information

TECHNIQUES

The techniques libraries apply to preserve a book printed on acidic paper depend on how far the deterioration has progressed. In a sequence of bad-to-worse stages of deterioration, the following actions may be taken.

Endangered Books

Endangered books are those printed on acidic paper, but not yet deteriorated enough to be considered brittle.

Environmental Controls for Libraries: All books benefit from improved, stable environmental conditions. Strict environmental control systems may be installed in libraries to slow the rate of deterioration of acidic paper. The most effective preventive technique is maintaining cool temperatures, controlled humidity, and filtering to remove gaseous pollutants that promote acid deterioration.

Deacidification: A deacidification process can be used to prevent the acid deterioration of paper. In this process, chemicals turn acidic books alkaline and leave a residual buffer that consumes acid in the future. The effect is to extend the life remaining in the paper at the time it is treated. Manual deacidification processes are available; however, the expense of page-by-page treatment makes its application prohibitive for large numbers of acidic materials in most libraries and archives. Only one mass deacidification process has been in operation for any length of time. For seven years the National Library of Canada has used the Wei T'o nonaqueous book deacification system. Several other mass deacidification processes are under development. One is near readiness: the Library of Congress is concluding the engineering phase for a mass deacidification process using gaseous diethylzinc (DEZ). Note: deacidification is a preventive measure and is not effective for treatment of books that have already become brittle.

Brittle Books

In the course of deterioration, an acidic book reaches a point beyond which the above treatments are not possible or effective. When a book reaches this point-of- no-return stage, it is defined as brittle. Technically, a book is considered brittle when the corner of a page breaks away after only a few folds. Steps taken by libraries to preserve brittle books depend on the intellectual and artifactual value of the book itself, the policies of the library, and the resources available.

Copying: The text can be photocopied onto alkaline paper.

Reformatting: The text can be transferred onto another medium such as archival microfilm or optical disk.

Paper Strengthening: Paper may be strengthened by chemical impregnation. One promising approach is parylene coating. This does not however, retard the process of chemical deterioration itself, unless deacidification is also part of the treatment.

Conservation: A range of conservation treatments are available to preserve the book in its original form. However, these time-consuming and expensive processes are generally reserved for items with artifactual value that must be retained in the original.

Preservation of Libraries and Archives

Chandru J. Shahani
William K. Wilson

Our writings, the visual images of our times, and the sounds of our civilization are all recorded on materials which are organic in nature and therefore inherently impermanent. They are subject to deterioration and decay as they age (Fig. 1). The task of preserving such vestiges of the past and the present for tomorrow's historians and researchers is the lot of our great libraries and archives. The challenge they face is of enormous proportions. The collections of each institution occupy millions of cubic feet of space. Added to the magnitude of their task is its complexity: besides books, documents, maps, and other artifacts on paper, which generally comprise the bulk of their collections, libraries and archives must care for and preserve a wide variety of materials that have been used over the course of time to record and store information. These may range from early materials such as clay tablets, papyrus, and palm leaves to today's sophisticated data storage media.

Chemical principles help custodians of the written word fight the effects of deterioration and decay

Every composite of materials represents an individual chemical system with its own set of problems. Such problems beset even the most recently developed media. For example, microfilm may develop "measles" or microspots if it is not stored properly, negatives on a cellulose acetate base may suffer severe distortion as the acetate shrinks with age, color film and photographs may fade or acquire new tints, and magnetic tape may begin to lose metal oxide particles and the recorded information as the adhesive deteriorates. A comprehensive description of the entire library and archive preservation task being clearly beyond the scope of this brief article, we have chosen to confine our discussion to an area that has been the subject of considerable study, the preservation of books and other paper-based records. Conservation techniques mentioned here often are not relevant to the preservation of works of art on paper.

William J. Barrow, who made significant and lasting contributions to our present understanding of the problem of book and paper deterioration, projected that most books from the first half of the twentieth century would not be in usable condition in the twenty-first (*1*). A recent survey at the Library of Congress estimated that as many as 25% of the books in its general collection may be in brittle condition, even though the collection receives good care and is well housed. We suspect that the condition of most other library and archive collections around the world is not likely to be much better. Collections in tropical countries, which are often stored at higher temperatures under greater humidity, may well be in worse condition. Individual works can probably survive indefinitely with costly manual restoration measures applied on a selective basis. But if present trends are not reversed, we shall continue to part permanently with increasingly large portions of our general collections.

Until the beginning of the nineteenth century, all paper was handmade (Fig. 2). Linen or cotton rags were beaten in water, and the separated fibers were collected on a wire frame mold to produce individual sheets of paper. Because of the limited supply of rags and the small output of the papermaking process itself, the production of paper could not keep up with the demand created by the printing press. A part of this problem was solved around 1800 by the invention of the Fourdrinier machine, which made paper on a continuous belt of fine-mesh wire, feeding an endless sheet onto heated rollers to dry.

Not unlike other great advances in technology, the early machine-made paper, which was produced by a process that clearly needed further refinement, created much apprehension. From woeful accounts of early-nineteenth-century bibliophiles, it appears that the machine-made paper must indeed have been far inferior to the handmade paper of the day. Cotton fiber was substituted for the stronger linen fiber. The cotton rags were ground excessively, reducing the fiber length. The resulting cotton pulp was bleached with large amounts of calcium hypochlorite and chlorine to improve its appearance. Papermaker's alum, which is really not an alum but aluminum sulfate, was then introduced to size the paper. (Sizing imparts resistance to water absorption and feathering of inks.) To overcome the increased alkalinity from the bleaching operation, copious amounts of alum had to be used. The alum left the sheet highly acidic. By contrast, handmade paper was sized by

Chandru J. Shahani is Research Officer at the Library of Congress. Formerly a nuclear chemist at India's Bhabha Atomic Research Center, he developed an interest in conservation science after a fellowship at New York University's School of Fine Arts. He was subsequently associated with the National Archives and Records Administration. William K. Wilson retired from the National Bureau of Standards and is now associated with the National Archives and Records Administration. He has studied the stability of paper and plastic films and is active in the development of standards for permanent record papers. Address for Dr. Shahani: Preservation Research and Testing Office, Library of Congress, Washington, DC 20540.

12

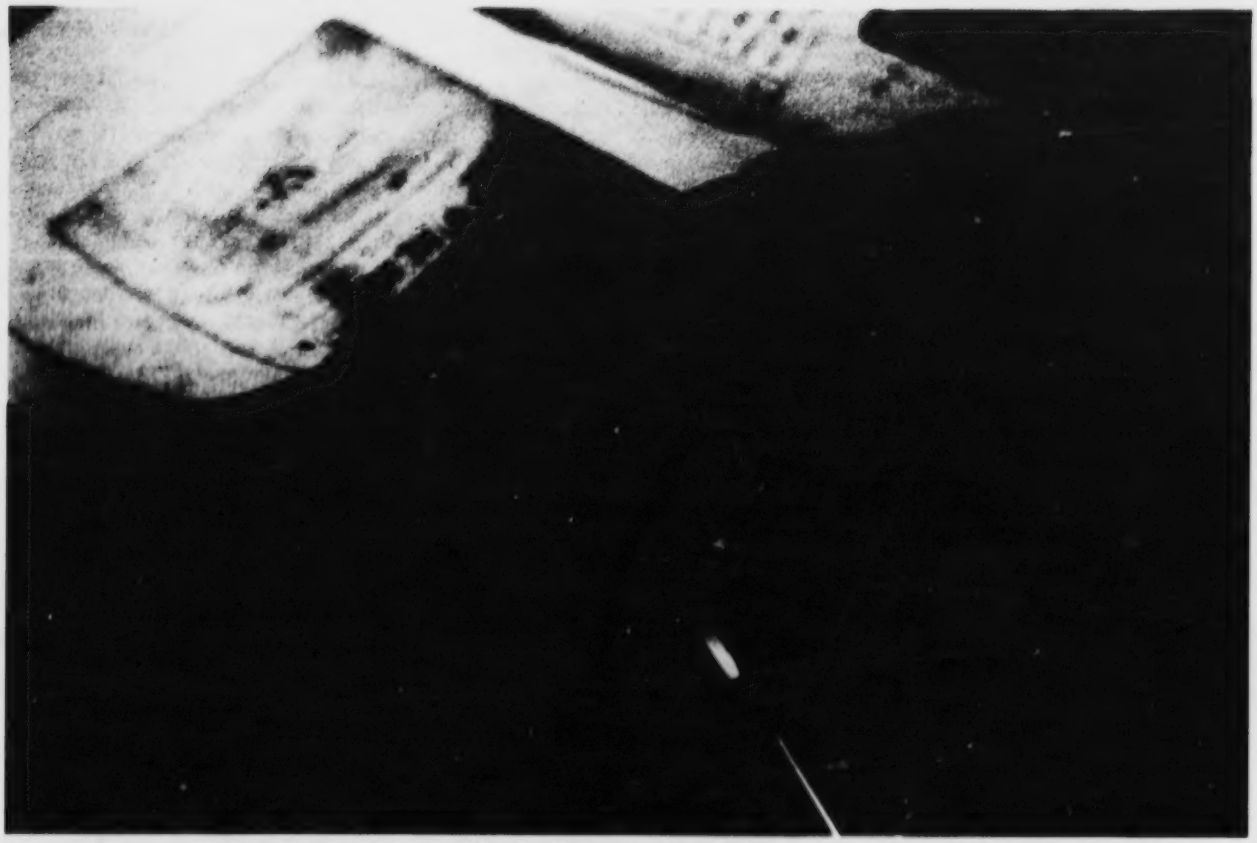


Figure 1. As many as 25% of the books in the general collection of the Library of Congress are in brittle condition, and the situation is probably no better at most libraries and archives around the world. Like other organic materials, paper is subject to deterioration and decay. Both inherent acidity and environmental pollution threaten its stability. Conservators must exercise extreme care in handling volumes like the one shown here; their restoration efforts must combine craftsmanship and artistic skills with a knowledge of chemical principles.

dipping the formed sheet in a gelatin solution, which often contained a relatively small concentration of alum.

A typical complaint about the new paper was this impassioned appeal by the English science writer and lecturer John Murray, in a letter to the *Gentleman's Magazine* in 1823: "Allow me to call the attention of your readers to the present state of that wretched compound called Paper. Every printer will corroborate my testimony; . . . our beautiful Religion, our Literature, our Science are all threatened. . . . I have in my possession a large copy of the Bible printed at Oxford, 1816 (never used), and issued by the British and Foreign Office, crumbling literally into dust. . . . I have watched for some years the progress of the evil, and have no hesitation in saying, that if the same ratio of progression is maintained, a century more will not witness the volumes printed within the last twenty years."

In a monograph entitled *Practical Remarks on Modern Paper* (1829), Murray presented the results of a chemical analysis of the leaves of his Bible: "To the tongue it presents a highly aluminious and astringent taste; and on a heated metallic disc, evolves volatile acid matter, exhibiting white vapors on the approach of ammonia. . . . Nitrate of silver detected the presence of muriatic acid." Murray ascribed the presence of hydrochloric acid to the interaction of calcium chloride from the bleaching operation with the acidic environment created by excessive amounts of alum size.

The bleaching process has improved considerably since Murray's time and no longer presents a threat to paper permanence. The sizing of paper, however, continues to be a major problem. Early in the nineteenth century, Moritz Illig, a German watchmaker working in his father's paper mill, developed a process by which size could be introduced into the pulp slurry before the sheet-forming operation (*2*). This process employed alum and rosin (impure abietic acid) to form an insoluble salt of uncertain composition, which served to fill up the open pores in the pulp. By the 1850s, Illig's sizing process had gained wide acceptance. Alum-rosin sizing was a decided improvement over the earlier process which used alum alone, but this new sizing technique also created an acidic environment within the paper. Although the detrimental effect of an acidic size is now well established as a primary source of impermanence, most of the paper manufactured in this country continues to be sized with alum and rosin or rosin substitutes.

With the mechanization of the papermaking process, manufacturers intensified their search for other raw materials that could be substituted for rags. A breakthrough came in 1851, when Hugh Burgess and Charles Watt developed the soda process for isolating cellulose fibers from wood. The subsequent development of sulfite and sulfate processes further advanced the technology for manufacturing chemical wood pulp. The isolation of cellulose from wood created a potentially unlimited

supply of paper for the foreseeable future, and the modern paper industry was born.

The search for ever-cheaper paper led in the 1860s to the manufacture of paper from groundwood pulp, also known as mechanical wood pulp. Groundwood pulp is obtained by simply grinding wood without any prior chemical processing. The fiber length is shortened in the grinding process, and lignin, which remains in the unprocessed pulp, hastens its degradation. As a result, paper made from groundwood pulp is weak to begin with and deteriorates easily upon aging. Newsprint generally includes 80 to 85% groundwood pulp. This paper is ideally suited for printing items which are of only immediate and short-term interest. Problems arise when, in the interest of economy, newsprint is utilized for works that need to be retained indefinitely, as it was during World War II and is even today in many developing countries. There are also cases in which materials of casual interest, such as newspapers, dime novels, and even comic books, come to assume permanent value as our perspective changes with the passage of time.

Scientific investigations of paper

John Murray's incisive analysis of the "sources of evil" that promote the deterioration of paper probably represents the earliest record of a scientific discussion on this subject. His comments appear even more remarkable when one considers that they preceded the discovery of cellulose, the primary constituent of paper, by a decade. Considerable scientific attention was brought to bear on the problem of decaying paper in the late nineteenth and early twentieth centuries, but progress was painfully slow as scientists recorded the gradual decline in experimental properties of paper as it aged over years and even decades.

An accelerated aging procedure for comparing the longevity of paper samples was finally developed by the Swedish scientist Gösta Hall in 1926 (3). The samples were kept at 100°C for a period of three days. Changes in their physical and chemical properties could then be measured to compare their stability. Hall also developed a procedure to obtain a measure of the acid content of paper. With minor modifications, these two experimental procedures have been retained to this day as standard methods of the Technical Association of the Pulp and Paper Industry. Another important early researcher, Edwin Sutermeister of the S. D. Warren Company, first suggested that a paper formulated for stability should contain an alkaline filler. Alkaline-filled papers made under Sutermeister's direction in 1901 remain in excellent condition today (Fig. 3).

Tests conducted at the National Bureau of Standards in the late 1930s confirmed that paper with an excess of alum was highly acidic and unstable (4). Paper with an excess of rosin, which had a pH close to 7, was considerably more stable than other alum-rosin sized papers. Paper samples containing calcium carbonate showed an even better retention of their physical properties after accelerated aging. When the various papers were tested again after 36 years, the data showed a good correlation between natural and accelerated aging (5). Curiously, however, the paper with an excess of rosin over alum, which was almost neutral, compared favorably with the paper containing the alkaline calcium carbonate filler.

Any account of the early research would not be complete without a discussion of the work of William Barrow at the Virginia State Library. Before Barrow's pioneering work beginning in the 1930s, book and paper conservation, or "restoration" as it was called, was looked upon as a craft without any scientific underpinning. Early restoration workers were highly skilled, as is evident from the superb work done on many documents in the late nineteenth and early twentieth centuries. However, they tended to select treatments and materials on the basis of their immediate practicality, without due consideration of their long-term effects. At the same time, the scientists, who were well aware of the enhanced stability that an alkaline reserve bestowed on paper, were mainly concerned with the technology of manufacturing. It was William Barrow who first applied the scientific observations of Sutermeister, Hall, and others to the restoration of documents and books. He devised a deacidification process, in which the acidity in an old document is neutralized and an alkaline reserve is added to the paper to prevent the recurrence of acidity (6). The idea suggested by this process underlies the

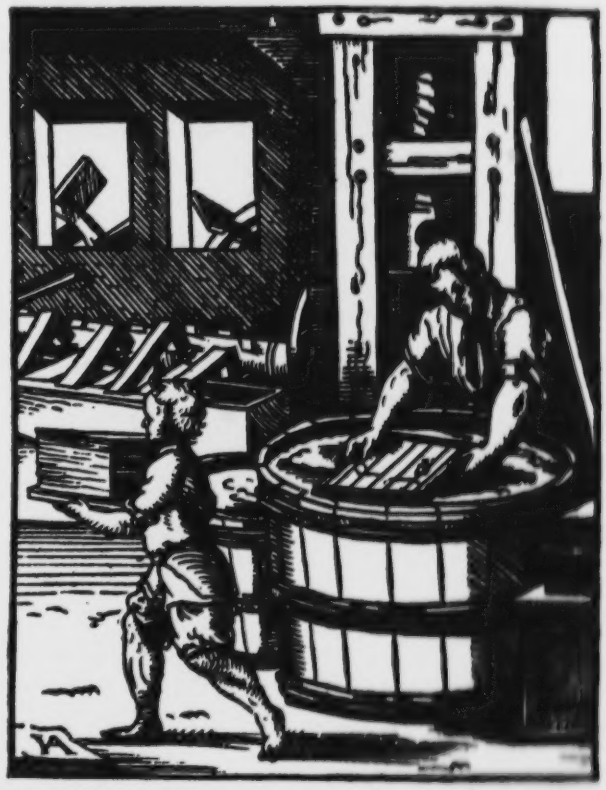


Figure 2. Paper made before the nineteenth century shows greater resistance to deterioration because of its much lower acid content. Both the material used—linen or cotton rags—and the process by which it was beaten in water and the separated fibers collected on wire frame molds to make individual sheets of paper were superior to materials and processes introduced in the nineteenth century. This woodcut by the sixteenth-century German artist Jost Amman shows a papermaker at work, taking a mold from a vat. Behind him can be seen a press, in which the sheets were placed between layers of felt.

most significant treatments for preservation of books and paper practiced today.

How paper ages

Whether a sheet of paper lasts indefinitely or only briefly depends on the materials and methods used in its manufacture as well as on the environment in which it is stored. Since the early observations of Murray and the practical solutions suggested by Sutermeister and Barrow, it has been repeatedly demonstrated that additives which create acidity within paper hasten its deterioration. Acidic species catalyze hydrolytic degradation of the polymeric cellulose molecules, reducing their chain length; even a few chain scissions per molecule cause a substantial loss of physical properties. Mildly basic species such as calcium or magnesium carbonate minimize the acid concentration and therefore the rate of the acid hydrolysis reaction. The cellulose molecule can also suffer hydrolytic cleavage in an alkaline environment. Hence the need for a weakly basic compound to buffer the pH of paper close to neutrality.

Oxidized cellulose structures that may be introduced during the bleaching process can also adversely affect paper. Carboxyl groups in the cellulose matrix have been shown to accelerate the process of degradation, especially in the presence of trace concentrations of copper and iron metals. In such cases, considerable yellowing of paper results, along with a loss of physical properties (*7*). Recent work has shown that copper and iron catalysts are much less effective in a nonacidic environment. Thus, the deacidification of paper stabilizes it also against oxidation by metal ions (*8*). In the absence of metal catalysts, oxidative degradation does not appear to be a significant factor, since the concentration of aldehyde, ketone, and carboxyl groups does not change appreciably during accelerated aging. Acidic species and metallic contaminants have also been shown to catalyze the cross-linking of cellulose (*9*). Residual lignin in wood pulp can acclerate the degradation of paper too. Lignin itself has a fairly stable structure, but chlorinated lignin can cause paper to yellow (*10*).

J. A. Chapman was probably the first to demonstrate the importance of environmental conditions, publishing his results in 1919 and 1920 (*11*). He showed that books stored in libraries in the tropical areas of India deteriorated more rapidly than the same books stored in cooler areas in northern India or in England. Since then a considerable body of data has been developed using accelerated aging to show that high temperatures, as well as high levels of relative humidity, facilitate the degradation of cellulose. A further disadvantage of high humidity is an increase in the rate of mold growth, which occurs over a wide temperature range if the relative humidity exceeds 70%.

F. L. Hudson and C. J. Edwards tested a book that had been left in Antarctica by the ill-fated expedition of Robert Scott in 1912 and preserved there until 1959 (*12*). They compared books of the same time stored in England, observing statistically significant differences for several physical properties, which suggested that the cooler environment greatly increased the stability of paper.

The magnitude of the preservation problem created by air pollution has been indicated by studies comparing books from libraries in heavily polluted cities with the same books stored in rural areas (*13*). Laboratory studies have shown that paper exposed to small amounts of sulfur dioxide and cellulosic fibers exposed to nitrogen oxides undergo substantial degradation (*14, 15*). The damage to books takes the form of a phenomenon known as browning, as well as a definite weakening of the edges of the leaves. Degradation from polluted air was probably a more serious problem 50 to 100 years ago, when unvented gas space heaters were common and gaslights were used for illumination. Since sulfur exists as an impurity in most sources of natural gas, there was a steady supply of sulfur dioxide. This was oxidized to sulfur trioxide by metallic impurities in the paper, such as manganese and iron. Sulfur trioxide combines easily with moisture to produce sulfuric acid.

Barrow projected that most books from the first half of the twentieth century would not be in usable condition in the twenty-first

Ozone can conceivably exert a deleterious effect on paper by inducing the formation of peroxide groups in the presence of moisture (*16*). Trace concentrations of metal catalysts such as copper and iron can then decompose the peroxide groups to initiate oxidation reactions, which in turn can lead to chain scission. However, there is no direct evidence to show how much of a threat ozone presents to the permanence of paper under ambient aging conditions. In the case of nitrogen oxides too, experimental work is needed to determine tolerance levels.

Exposure of library and archive collections to light is not usually a serious factor except for items on exhibit. Moreover, window glass filters out ultraviolet radiation below about 330 nm. Light of wavelengths higher than 310 nm cannot cause direct photolysis of pure cellulose. However, some dyes and related compounds, lignin, and metal ions can absorb light in the near ultraviolet and visible regions of the spectrum, and in their excited states induce photo-sensitized degradation of cellulose. Such reactions can proceed by various mechanisms, some of which require the presence of oxygen or moisture, or both (*17*).

Materials that are associated with paper records have their own sets of problems. Very few specimens of ink writing have resisted decay and disintegration since antiquity. Those which have survived were made from pigments closely related to such materials as bitumen, lamp black, cinnabar (red mercuric sulfide), minium (red lead), gold, and silver (*18*). More recent historic documents were written in iron gall inks, which were made of gallic and tannic acid, ferrous sulfate (copperas), and gum arabic (Fig. 4). In their varied and often uncertain preparation, other acids such as sulfuric, hydrochloric, and acetic acids were also added, as were other metallic sulfates, including alum. The excessive acidity of such inks is evident in many an old document, where the ink

is seen to have eaten through the paper. The proportions of the ingredients and the extent of acidity determine not only the color, but also the lightfastness of the ink; badly made iron gall inks not only fade easily, but may also be water-soluble.

Some historic documents present interesting examples of fading. George Mason's draft of the Virginia Declaration of Rights (now at the Library of Congress) was evidently written in two inks. One of the inks has faded considerably, while the rest of the writing is as clear today as it might have been in 1776. The Declaration of Independence also appears highly faded. This most-treasured but much-abused document probably lost most of its ink when the printer William J. Stone pressed a moistened sheet of paper against it for a copper engraving plate that he prepared in 1823. The Treaty of Ghent (1814) was written in iron gall ink on parchment. It is remarkable that even without significant exposure to light, the text of the treaty has faded across several pages to such an extent that it is barely legible. An example of fading of fountain pen ink is presented by the instrument of Japanese surrender (1945), which bears signatures in various inks, some as clearly visible as they were on the day they were written, while others have faded to various extents. This document was on exhibit for some time, and the fading was in all probability induced by light.

The Declaration of Independence probably lost most of its ink when the printer William J. Stone pressed a moistened sheet of paper against it for a copper engraving plate that he prepared in 1823

Leather is plagued by the same enemies as paper: acid from within and environmental conditions from without. Leather that has been affected by acid from the tanning process, air pollution, and poor storage conditions develops a surface which appears to be crumbling into small reddish particles, or "red rot." Parchment, which is also made from animal skin, is more resistant to the same influences, as it ends up in an alkaline condition at the end of the manufacturing process. Its alkaline content neutralizes acidic pollutants in the atmosphere. Specimens of parchment kept in a cool, dry place are known to have survived almost 2,000 years. However, substantial drops in humidity can cause parchment to suffer severe distortions through uneven shrinkage. It can lose its suppleness through dehydration and become stiff and brittle.

As we will see, there are several approaches available to a custodian concerned with the preservation of archival collections, such as conservation treatment to restore and photoduplication to minimize the use of rare and delicate documents. But the custodian's primary effort should be directed toward providing the right environment for the storage, use, and exhibit of the collections. A good environmental purification and control system stabilizes temperature and relative humidity at desired levels, while filtering out sulfur and nitrogen oxides and particulate matter. Lower temperatures and relative humidity benefit most items in a collection. Environmental conditions in storage areas usually represent a compromise between the requirements of the collections and human comfort.

The Declaration of Independence and the Constitution, both on permanent exhibit at the National Archives, are preserved mainly by environmental control. Each leaf of these documents is sealed within a glass enclosure in an atmosphere of humidified helium (*19*). A filter absorbs all ultraviolet radiation, as well as the more energetic portion of visible light. Furthermore, the intensity of light is restricted to 3 footcandles per hour. At the Library of Congress, the Gutenberg Bible (one of three existing copies printed on vellum) and the Mainz Bible are on display inside specially constructed enclosures that provide a protective environment of filtered air at a constant temperature of 10°C and a relative humidity of 50%. These exceptional items, on which exceptional care is lavished, illustrate the importance of environmental controls.

Conservation of paper

In their work, paper conservators blend craftsmanship and artistic skills with a knowledge of chemical principles to achieve remarkable results (Fig. 5). They attempt to restore and at the same time stabilize highly deteriorated and brutalized items. Because of the close attention to detail, such work tends to be expensive. However, many conservation dollars can be saved simply by knowing what not to do. Many an important document has been ruined by well-intentioned but misconceived treatments to save it, such as the indiscriminate use of common pressure-sensitive cellophane tape for mending (Fig. 6).

One of the most effective treatments that a conservator can apply to save paper artifacts is deacidification. Although John Murray decried the presence of acidic species in paper as a "source of evil" as early as 1829, it was not until 1936 that a "Process for Chemical Stabilization of Paper and Paper Products" was patented by Otto Schierholz, who immersed sheets of paper in solutions of alkaline earth bicarbonates to neutralize the paper's acidity and imbued the paper with a mildly basic compound to prevent recurrence of an acidic condition.

How long will this copy of *American Scientist* last?

Since May 1986, *American Scientist* has been printed on Escanaba Enamel, which is manufactured by Mead Paper at its Escanaba, Michigan, mill. Because the wood pulp from which the paper is made is produced by a combination of chemical and mechanical processes, it does not have the impurities present in plain groundwood pulp, the main constituent of newsprint. The paper is then coated with a mix of binders—predominantly starch and latex—and pigments—predominantly clay. The base paper is somewhat acid, but the coating is alkaline, and thus the finished product may age less rapidly than many other papers used for books, newspapers, and magazines.

However, Schierholz was more interested in producing nontarnishing paper than in enhancing its permanence.

In 1943, William Barrow described a similar process in which a document was first immersed in a dilute calcium hydroxide bath, which was followed by treatment with calcium bicarbonate (*6*). A reading of Barrow's article suggests that he was not aware of Schierholz's patent. Later, Barrow also used a magnesium bicarbonate solution to spray leaves in bound volumes (*20*).

To avoid the two steps in Barrow's deacidification process and also the rather high pH of the calcium hydroxide bath, James Gear and his colleagues at the National Archives developed a technique of immersion in an aqueous solution of magnesium bicarbonate (*21*). This appears to be the preferred process in paper conservation laboratories today, although many conservators maintain that magnesium imparts a yellowish tint to some papers, especially newsprint.

In aqueous deacidification treatments, the affinity of cellulose molecules for water allows the solutions to penetrate the fibrous structure of paper, thus facilitating a uniform deposition of the alkaline reserve. Such treatments, and even a simple wash with water, often increase the strength of paper perceptibly, possibly by washing out fine particulate matter. Closer contact between fibers probably enhances cohesion. The treatments also serve to wash out brownish degradation products and remove the musty smell of old paper, giving it a cleaner appearance and feel. However, any ink even partially soluble in water will bleed in an aqueous bath. There was an obvious need for a process which could safely treat documents without dissolving the ink on them.

Barrow in this country and A. D. Baynes-Cope in England attempted in the 1960s to deacidify paper using ammonia and volatile amines like butyl amine, piperidine, and diethylamine but soon concluded that such treatments produced only a temporary change in the pH of paper, which reverted to its acidic condition after giving up the amine that it had absorbed (*22*). In a variation of this technique, William Herbert Langwell impregnated sheets of tissue paper with cyclohexyl amine carbonate (CHC). These "VPD sheets" (for vapor phase deacidification) could be inserted in books sitting on a library shelf, and CHC would permeate the book and neutralize all acidic species (*23*). However, like other volatile amines, CHC does not achieve a permanent neutralization, and no alkaline reserve is deposited in the paper. Moreover, CHC hydrolyzes to yield cyclohexylamine, which has an unpleasant odor characteristic of amines. Thus, although convenient, this process does not provide lasting protection, and it may even pose a health hazard.

It seemed that the only recourse was to employ nonvolatile basic compounds that could be dissolved in nonpolar organic solvents, since such solvents have a limited solubility for ink that dissolves in water. Baynes-Cope employed a solution of barium hydroxide in methanol to deacidify paper (*22*). He found this treatment to be as effective as an aqueous magnesium bicarbonate treatment, although the organic solvent's penetration into the fibrous structure of the paper was observed to be appreciably slower. The toxicity of barium salts and methanol is a distinct disadvantage of this process. Also, because of its relatively high dipole moment, methanol does not offer a great advantage over water in the prevention of ink solvation.

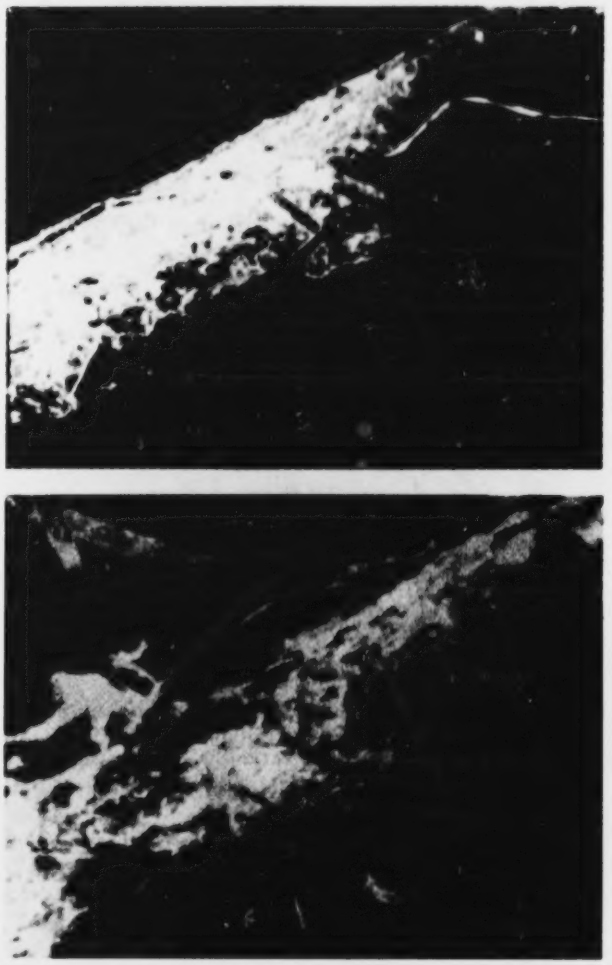


Figure 3. The introduction in the early nineteenth century of machines to make paper led to a search for new materials and processes to use the machines' capacities to the full. Wood pulp replaced rags, and alum-rosin sizing was added directly to the pulp before sheets were formed. (Sizing reduces the absorbency of paper and thus prevents feathering of ink.) The result was a much higher acid content. Only by the end of the century was it discovered that papers with an alkaline content resisted aging much better. These photomicrographs (× 38) show folds in alkaline (*top*) and acid (*bottom*) sheets produced in 1901 by Edwin Sutermeister. The alkaline sheet is relatively smooth, but the acid sheet is severely fractured. (Photographs courtesy of S. D. Warren Co.)

In an earlier phase of his investigation in 1961, Baynes-Cope had tried a magnesium methoxide solution, which he found to be highly effective but extremely difficult to prepare and store (*22*). Independently, Richard Smith at the University of Chicago developed a process employing a magnesium methoxide solution in a mixture of methanol and a freon solvent (*24*). The resulting solution could be conveniently stored and employed, but it too did not offer a practical deacidification treatment, because magnesium methoxide begins to hydrolyze and precipitate almost as soon as it is poured into a tray for use. Finally, George Kelly and John Williams at the Library of Congress combined magne-

sium methoxide with carbon dioxide to produce methyl magnesium carbonate, which hydrolyzes much more slowly on exposure to air (25). Its stability allows effective deacidification, as well as convenience. But so long as paper comes into contact with a solvent, there is always a chance that inks and paper constituents such as coatings, sizings, and optical brighteners may be dissolved. Therefore caution must be exercised in employing such treatments. Testing for solubility of colors and inks before treatment is essential.

In spite of their effectiveness, the single-sheet deacidification processes described above are inadequate for massive library and archive collections. Manual treatments, which allow greater control, must be employed for intrinsically valuable items, but a more affordable and practical approach is needed for the general collections which make up the bulk of the holdings of a library or an archive. Scientists have thus attempted to develop mass deacidification processes for the collective treatment of large batches of books.

Many an important document has been ruined by well-intentioned but misconceived treatments to save it, such as the indiscriminate use of common pressure-sensitive cellophane tape for mending

To be effective, such processes must deposit a permanent, nonvolatile alkaline reserve that completely and uniformly penetrates the fibrous structure of paper regardless of any sizing or coating. It must not damage natural lubricants in leather, binding adhesives, or any coloring matter, such as printing inks or dyes, used in covers. The alkaline reserve must not be toxic or impart any color or odor to the books. In addition the process must, of course, be cost-effective. Attempts to fulfill all of these requirements have thus far achieved a limited degree of success, but total success now appears to be within reach. The processes fall into two broad classes: those that employ a liquid to incorporate an alkaline reserve in paper and those in which the active agent is vaporized to enable it to penetrate books and paper.

A liquid-phase process developed by the Wei T'o Corporation of Chicago, which uses magnesium methoxide dissolved in a mixture of methanol and a freon solvent, has been employed at the Public Archives of Canada since 1981 (26). Books are packed in stainless steel crates and placed in a reaction chamber with a capacity of about 2 cubic feet. The Canadian plant has been reported to have the capability to treat 150,000 books per year. Another liquid-phase facility, which employs a solution of methyl magnesium carbonate, has been constructed at the Centre de Conservation, Bibliothèque Nationale in France. A very different liquid-phase process has been developed by the Koppers Company. This process uses organic liquids to deposit particles of basic compounds uniformly throughout the fibrous structure of paper. Unlike other solvent-based systems, it does not depend on the absorption of solvated species by paper.

Since all these processes are still proprietary, our information regarding them is only superficial. However, it is clear that because of the susceptibility of dyes in book covers and some inks to bleed and run in the solvent base, books must be individually screened before they can be treated, creating the potential for a bottleneck in a high-capacity operation. Even the most careful preselection cannot avoid extraction of pyroxilin from book covers and of optical brighteners from paper. The risk of running inks and colors can be minimized by decreasing the alcohol content, but that reduces the effective concentration of the alkaline reserve in paper.

A vapor-phase process would appear to be the logical alternative for a large collection. Until recently, all vapor-phase treatments devised for deacidification of books en masse involved the use of volatile basic compounds. These included CHC, the limitations and hazards of which have already been pointed out, the ammonia process employed at the National Archives of India (27), and the morpholine process developed at the Barrow Laboratories (28). The latter two were found to have only a temporary effect on the acid content of paper.

It became apparent that to succeed, a vapor-phase treatment must employ a compound that would be volatile enough to permeate the fibrous structure of paper within a mass of books but would have a chemistry that could be manipulated to yield a mildly basic and essentially nonvolatile compound. George Kelly and John Williams successfully attained this objective in 1976 (29) by designing a mass-deacidification process employing gaseous diethyl zinc (DEZ).

At room temperature, DEZ is a colorless liquid. It boils at 117°C. When it is combined with oxygen, a highly exothermic reaction takes place:

$$(Et)_2Zn + 7O_2 \rightarrow ZnO + 4CO_2 + 5H_2O$$

Because liquid DEZ ignites spontaneously when exposed to air, a primary consideration in its use is the exclusion of air. DEZ also reacts readily with water:

$$(Et)_2Zn + H_2O \rightarrow ZnO + 2EtH$$

This reaction, which is also highly exothermic, provides the means by which DEZ impregnates paper with uniformly distributed particles of finely divided zinc oxide. When DEZ comes into contact with the paper, it reacts essentially with the water molecules bound to cellulose's polymeric chains. The zinc oxide provides the desired alkaline reserve. Its concentration can be controlled by manipulating the water-DEZ reaction. There is no evidence of any reaction with cellulosic hydroxyls.

DEZ also neutralizes all acidic species present:

$$(Et)_2Zn + 2HX \rightarrow ZnX_2 + 2EtH$$

This reaction is complete and irreversible. Unlike other deacidification processes, the neutralization of existing acidity does not take place at the expense of the alkaline reserve. Thus, a highly acidic book and a neutral book are both provided with an optimum alkaline reserve. Also very important is the fact that bleeding of inks or dyes is totally excluded in this gaseous treatment.

Figure 4. Materials used with paper have their own special problems. The brownish halo on the letters shown here—from Abraham Lincoln's second inaugural address—is caused by the acidity of the iron gall ink with which the document was written. In more extreme cases, the ink can eat through the paper.

In practice, the DEZ process begins with the loading of books in an airtight reaction chamber, which is then sealed off until the treatment has been completed. Air is displaced by nitrogen, and the pressure is lowered to reduce the paper's moisture content. Under ambient conditions, an average book paper may contain 4 to 6% moisture. This is reduced to less than 1%. Gaseous DEZ is then introduced into the reaction chamber and allowed to permeate the paper. During this operation the temperature may rise to about 60°C. At the completion of the reaction, excess gas is pumped off, condensed, and collected to be used again.

Complete removal of DEZ is achieved by purging the chamber with dry nitrogen and evacuating to a pressure of 0.2 torr or less. Water vapor is then introduced under controlled conditions to rehumidify the treated books. The entire process can be completed in three to five days, including loading and unloading the chamber.

Once the feasibility of the process had been demonstrated on a small scale in the laboratory by Kelly and Williams, the Library of Congress looked for industrial facilities in which the process could be further studied on a larger scale. After experiments with a few hundred books at General Electric's Space Center in Valley Forge, Pennsylvania, 5,000 books were treated in a vacuum chamber at the Goddard Space Flight Center in Maryland (Fig. 7). While this run showed that DEZ could be employed easily and safely, the books were not uniformly exposed: diffusion was not fast enough for the DEZ vapor and the ethane formed in the reaction to mix easily. The result was that the concentration of DEZ decreased appreciably from the bottom of the chamber to the top. In addition, concentric, iridescent rings were left on the books' covers.

Clearly, further refinement of the process was necessary. With NASA's continuing cooperation, a research facility with a reaction chamber large enough to accommodate 100 books was constructed in 1983. After thirteen experimental runs, it was felt that a pilot plant could be built to put the process to a final test before the construction of a full-scale plant.

During the very first dry run of the pilot plant, a small fire broke out, the first mishap in eight years of work with DEZ. In an unprecedented step, the process was brought to a halt in midoperation, and liquid DEZ sat in the plant's pipes for several weeks instead of a few minutes as in normal operation. When the operators tried to start up the process again, a pipe in the delivery system burst and another fire broke out. Subsequently, a NASA review panel ascribed the mishaps to flaws in the design of the pilot facility, as well as in operational procedures.

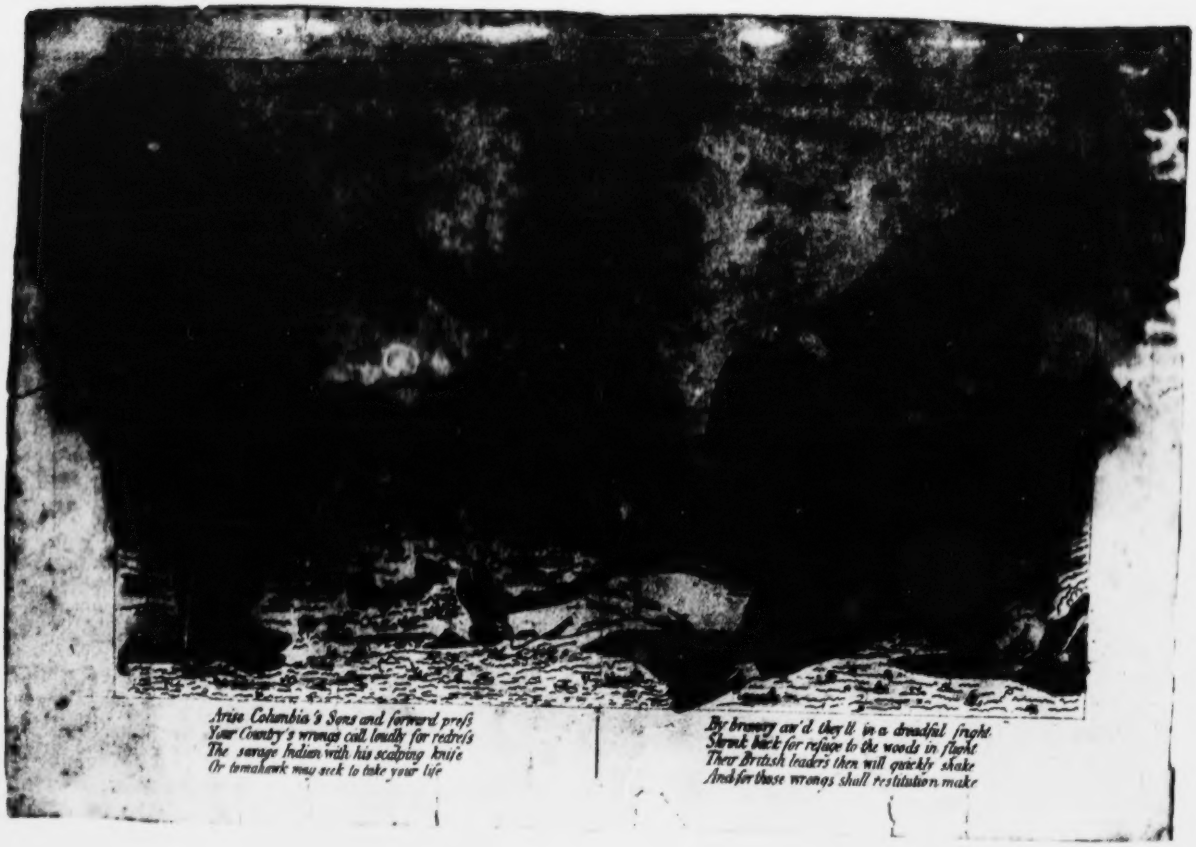
The Library of Congress has now undertaken a fresh effort under the guidance of chemical engineers with expertise in organometallic process chemistry. A newly designed pilot plant is scheduled to begin operation during the summer of 1987, and a full-scale plant with a chamber capacity of 7,500 to 9,000 books is expected to be in operation by 1989.

Reinforcing brittle paper

The deacidification process stabilizes paper, but it cannot restore lost physical properties. Once paper has deteriorated to a state of brittleness, it needs reinforcement to protect it against fracture. The earliest technique employed for supporting brittle paper was silking. A starch paste or paraffin wax was used to sandwich paper between sheets of finely woven silk. After several decades of extensive use, silking was gradually supplanted by cellulose acetate lamination. Although some proponents of lamination maintained that silk deteriorated after about 20 years, a number of documents silked around the turn of the century are still in excellent condition. Many of these documents were repaired so skillfully that the silk layers cannot be easily discerned by an unpracticed eye.

Cellulose acetate lamination was developed in the 1930s by scientists at the National Bureau of Standards (*30*). Paper sandwiched between two thin sheets of cellulose acetate film was heated under pressure in a hydraulic press. Later William Barrow designed a lamination press in which paper was first heated between sheets of cellulose acetate and then pressed between polished rollers (*31*). To strengthen the paper further and eliminate the unaesthetic sheen of cellulose acetate, Barrow also incorporated fine layers of tissue paper on either side.

Cellulose acetate lamination not only imparts re-


Arise Columbia's Sons and forward prefs
Your Country's wrongs call loudly for redreſs
The savage Indian with his scalping knife
Or tomahawk may seek to take your life
By bravery anim'd they'll in a dreadful fright
Shrink back for refuge to the woods in flight
Their British leaders then will quickly shake
And for those wrongs shall restitution make

20

Figure 5 (*facing page*). Conservation treatment of paper can employ a variety of substances. Aqueous solutions such as the dilute sodium borohydride solution with which this cartoon from the War of 1812 was treated can be used effectively, but great care must be taken because of their tendency to cause soluble inks to bleed.

newed strength, but when preceded by deacidification can extend indefinitely the life of an embrittled paper. Since it is a mechanized process, it can provide high output at a limited cost. This seeming advantage, however, can become a potential hazard to the documents. The risk comes from an assembly line operation in which documents do not receive individual attention but are indiscriminately laminated without regard to the nature of paper or inks.

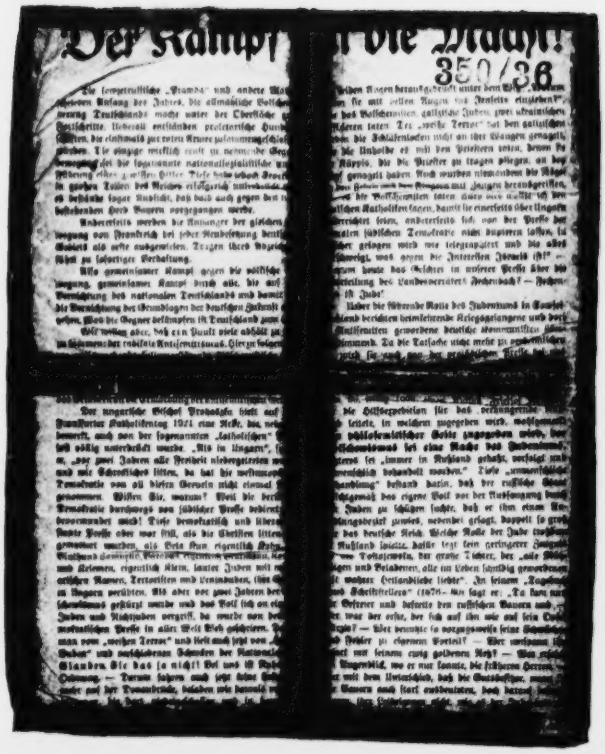
Lamination techniques using very fine tissue paper with acrylic adhesives for bonding have been developed in recent years, but the technique that appears to find most favor with paper conservators is polyester encapsulation, which was developed at the Library of Congress (32). In this simple procedure, paper is sandwiched between two sheets of mylar or other polyester film, which are sealed around the edges. Polyester encapsulation is popular because it is easily reversible: there is no adhesion between paper and the plastic film. Thus it is more in tune with the contemporary conservation philosophy of doing as little as possible to alter the essential nature of the object in need of protection. Lamination still has a place in preservation, especially in high-volume applications, but it must be used judiciously.

Encapsulation and lamination are useful for supporting single sheets, but they have only limited applicability to books. Books can be unbound and the individual leaves encapsulated or laminated before being rebound, but this is an expensive process which cannot be applied to millions of volumes in a general collection. Can a chemical process be developed that will strengthen the brittle paper of old books?

Three different approaches are being actively pursued. Bruce Humphries at the Nova Tran Corporation has used a parylene coating—employed by industry to protect electronic parts—to strengthen papers in a book, as well as other objects such as insect specimens in museums (33). The main drawback of parylene coating is its high cost. The British Library is developing a technique which involves joining the shortened cellulose chains in brittle paper to another polymeric molecule through a graft copolymerization process. The technique has been successfully applied in the laboratory, and construction of a plant is being considered (34). The National Library of Austria employs a bulk process for strengthening newsprint (35). Newspapers are impregnated in an evacuated chamber with an aqueous solution containing methyl cellulose, polyvinyl acetate, and calcium or magnesium salts. The soaked newspapers are then freeze-dried.

Making copies

Thus far we have considered techniques and processes for saving library and archive collections in their original forms. But invariably there are items in the collections which need to be saved only for their informational content. Such items can be copied and the originals



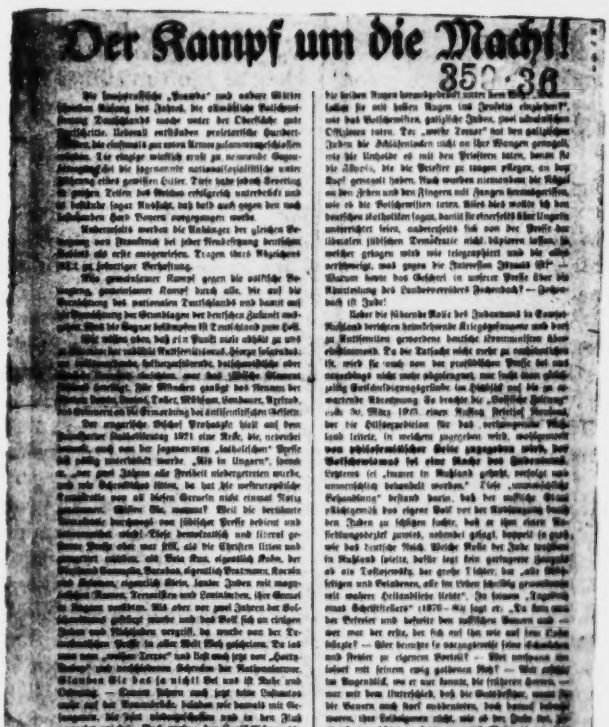


Figure 6. Efforts to restore deteriorated documents sometimes entail the correction of earlier attempts that themselves contributed to the deterioration. A well-meaning person used pressure-sensitive cellophane tape to mend this Nazi propaganda sheet. Subsequently, a paper conservator employed organic solvents to remove the tape and the stains the tape had created.

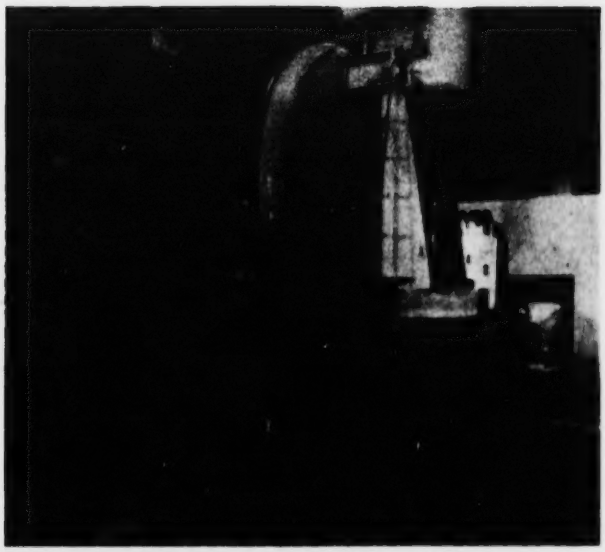


Figure 7. Deacidification processes that treat one sheet at a time are obviously not effective for whole library and archive collections. Mass deacidification processes rely on either a liquid or a vapor to penetrate large quantities of papers and books. The reaction chamber shown here was employed in the book deacidification program of the Library of Congress using gaseous diethyl zinc as the deacidifying agent.

discarded or retained, depending on the institution's policy. Unlike archives, whose holdings consist almost entirely of original records, libraries can sometimes find it possible to replace worn or brittle books with better copies on paper or in microform.

Making copies serves a useful purpose for items of high intrinsic value, since copies can be used to prevent wear and tear on the originals. A master copy is made from which other use copies are made in turn. The master copy receives almost the same care as the original, except that it is more accessible.

Master copies are generally made on the most enduring material. Microfilm and microfiche are accepted as archivally stable media, especially when a polyester-based film is used. Electrographic media, which produce a carbon image on a polyester substrate, are also highly stable. Even photocopied images can be considered archivally stable if they are on permanent paper. The newest and most promising medium for copying images is the optical disk. Several institutions are experimenting with it in analog as well as digital formats. Besides a good, crisp image, it offers convenient access along with an unprecedented compaction of space. Most manufacturers of optical disks are not claiming a lifetime greater than 10 to 20 years for their products, but it appears likely that an archival-quality optical disk will become available in the not-too-distant future.

Copying is not always the most cost-effective solution. In some cases, institutions may find it more convenient to preserve items in their original form, even when they have only informational value.

As we have seen, libraries and archives are learning to apply various processes and techniques to extend the permanence of their collections and exploring other media on which to make copies, but the creators of documents and books need to ensure that as far as possible only the most stable materials are used for tomorrow's records.

Less than 15% of the fine paper produced in the United States today is alkaline (*36*). The rest continues to be acid-sized with aluminum resinate. This situation compares poorly with the production of alkaline-sized paper in Europe, which accounts for 50% of output. There are several reasons why US paper manufacturers continue to make acid-sized paper: some printing processes do not work well with alkaline papers, and dyes developed principally for acid systems may not work in alkaline systems. Changing from an acid to an alkaline system can be costly, and it may mean reorienting a company's business. Librarians and archivists should be aware that there can be no stronger argument than that which the laws of supply and demand provide. Therefore, they must educate the consumer, who ultimately directs the course of any industry.

Many problems remain to be solved in the preservation of library and archive collections, but they no longer appear insurmountable. It would be Pollyannaish to presume that, because of technological advances, preservation problems will disappear. Instead, their nature will probably change. It is likely that in the research laboratory the emphasis will shift from paper to other media. As long as the human race entrusts its records to impermanent materials, the knowledge and expertise of the scientist will be needed to help preserve them.

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U.S. Promotes the Manufacture and Use of Permanent Paper

In comparison to earlier papers, most book papers produced after 1850 are relatively impermanent. Although the rapid deterioration and embrittlement of these papers is considered a threat to the preservation of library materials worldwide, the problem is particularly acute in U.S. libraries. One long-term solution to the brittle book problem is the manufacture and use of permanent papers. Several initiatives relating to this solution are currently underway in the U.S.

Historic Research

Edwin Sutermeister, who began his research at the S. D. Warren Company in the 1890's, is generally credited for having identified acid in paper as the primary cause of its decay. Sutermeister's findings were confirmed by further research initiated in 1957 by William J. Barrow. After extensive testing and analysis of book papers produced between 1507 and 1949 Barrow drafted specifications for paper that was both chemically permanent and physically durable. Unfortunately, paper made to these specifications was expensive to produce and lacked the aesthetic qualities desirable in book paper.

Standards Development

Building on Barrow's initial work, other individuals and organizations continued to develop specifications for permanent and durable paper. In 1975 the National Historical Publications and Records Commission (NHPRC) published *Paper Standards for Historical Publications*. Revised in 1977, these standards call for a minimum pH of 7.5 (measured by cold extraction, TAPPI T-509), a minimum alkaline reserve composed of either calcium or magnesium carbonate, and a minimum cross-direction fold endurance of 30 double folds at 1 kg. tension (25 replicates, TAPPI T-511).[1]

[1] Copies of the standard may be obtained from Mr. Roger Bruns, Publications Program, NHPRC, National Archives Building, Washington, D.C. 20408, U.S.A.

In May 1979 a national meeting was held in New York at which twenty representatives from the fields of publishing, paper manufacturing, and preservation of library materials discussed various aspects of the problem of preserving books for future generations. Following this meeting a Committee on Production Guidelines for Book Longevity was formed. The objectives of the committee were to increase knowledge about the durability of books and other materials and to encourage improvements in their physical properties.

The final report of the committee[2] developed several guidelines to be followed in paper production. They were adapted and simplified from standards set by NHPRC, the Library of Congress, and from the ASTM/ANSI Standard Specification for Bond and Ledger Papers for Permanent Records. The guidelines addressed issues of both permanence and durability. In the area of perma-

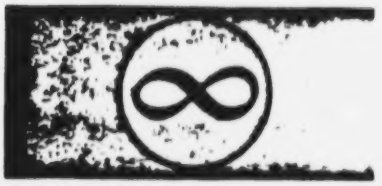
[2] The history of the committee and its reports were published in 1982 in *Book Longevity*, available for $3.00 from the Council on Library Resources, 1785 Massachusetts Avenue N.W., Washington, D.C. 20036, U.S.A.

nence they specified a minimum pH of 7.5 (cold extraction, TAPPI T-509) and a minimum alkaline reserve (calcium or magnesium carbonate, or both) of 2% based on oven dry weight.

These guidelines served as the starting point for the subsequent work of a committee formed by the National Information Standards Organization (NISO). The result of the NISO committee's efforts is the *American National Standard for Information Science—Permanence of Paper for Printed Library Materials* (ANSI Z39.48-1984).[3] The standard is now under consideration by the International Standards Organization (ISO).

The ANSI standard establishes the criteria for permanence of uncoated paper and states that paper meeting these criteria should last at least several hundred years without significant deterioration under normal library use and storage conditions. The requirements stated in the standard relate to pH (minimum pH of 7.5), fold endurance, tear resistance, alkaline reserve (minimum alkaline reserve equivalent to 2% calcium carbonate), and paper stock (shall include no groundwood or unbleached pulp). The standard also recommends that a statement of compliance should appear on the verso of a book's title page whenever paper is used that meets the standard. Such paper may also bear the symbol of compliance: the mathematical symbol for infinity, set in a circle.

Publication and distribution of the standard have helped promote permanent paper by providing paper manufacturers with an explicit set of guidelines from which to work, thus stimulating alkaline paper production and encouraging better quality control. By exactly defining the minimum requirements for permanent paper, the standard has also helped improve dialogue between preservation librarians and publishers. In addition, the standard has also been useful to preservation-conscious groups and individuals who are working to convince library directors, government agencies, and collection development officers that the manufacture and use of permanent paper can have a major impact on reducing the number of brittle books in the future.



Symbol adopted by ANSI to denote permanent paper.

In 1987 a new NISO committee was formed to revise ANSI Z39.48-1984 to include standards for coated as well as uncoated papers. The Z39 revision committee is considering several issues. These include whether the permanence of coated paper can be specified by the same characteristics as uncoated paper; whether new or modified tests are needed to measure the characteristics of coated paper; whether different permanence criteria are needed for different kinds of coated paper; and whether any interaction between the coating and the paper core affects the permanence of coated paper.

Permanent Paper Production

Alkaline paper production in the U.S. has increased tremendously in the past several years. More than thirty paper mills (compared with less than five a decade ago) now produce alkaline paper, and 10-15% of all fine paper produced in the U.S. today is alkaline. Whether all mills produce paper in strict accord with the ANSI standard is not clear, since many of the mills converted to alkaline production before the standard was published. The alkaline paper from these mills was being produced primarily for aesthetic reasons (brightness, opaqueness, surface smoothness) for industrial and commercial packaging applications.

Converting a paper mill from acid to alkaline paper production is initially quite costly, but can be

[3] The standard may be purchased for $7.00 from the American National Standards Institute, 1430 Broadway, New York, New York 10018, U.S.A.

IFLA PAC

International Preservation News is a publication of the International Federation of Library Associations and Institutions (IFLA) Core Programme on Preservation and Conservation (PAC) that reports on the preservation activities of IFLA and highlights international activities and events that support efforts to preserve materials in the world's libraries and archives. It is available without charge to interested institutions.

IFLA PAC Core Programme
National Preservation Program Office
The Library of Congress
Washington, D.C. 20540
USA.
Telephone: (202) 287-1840
Telex: 710-822-0185
Merrily A. Smith, Editor

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profitable in the long run. High retooling costs are offset by potential profit incentives resulting from streamlined production once the plant is fully operational. Greater stock strength is achieved by using calcium carbonate filler which allows the use of less expensive, shorter-fiber pulp. Less time is needed for paper drying because less pulp is used. Less pulp allows better wire drainoff which results in cleaner fabrics and less machine maintenance. Shorter drying time means less energy is used, thus enabling faster machine runs and increased production. Desirable archival characteristics are easily achieved, including superior brightness, opacity, and bulking. Finally, Environmental Protection Agency regulations for effluent contaminants can also be more easily met by alkaline mills because system enclosure is enhanced. The net result of these advantages, predicts one industry expert, is that within ten years the entire paper industry (or the great majority) will produce alkaline paper.

Continuing Initiatives

In January 1987 the Board of Regents of the National Library of Medicine held a special meeting to discuss the use of permanent paper, to increase awareness of the need to publish on permanent paper, and to discuss means for encouraging its greater use. The meeting was attended by publishers, editors, paper manufacturers and distributors, printers, biomedical researchers, librarians, and others concerned with the preservation of biomedical literature. Participants exchanged ideas and suggested strategies to increase the use of permanent paper.

Meeting results suggest that better information dissemination is needed regarding the costs of mill conversion, the cost of acid vs. alkaline paper stock, and the feasibility of producing an alkaline coated paper economically. Although the use in biomedical literature of permanent paper meeting ANSI Z39.48-1984 was overwhelmingly endorsed by all participants, it was agreed that increased public support and action to reinforce current planning are needed. Consequently, a task force was formed that is charged with identifying a set of principles for the use of permanent paper and with developing strategies for integrating permanent paper into biomedical literature publishing.

In April 1987 the Andrew W. Mellon Foundation awarded $36,000 to NISO to assist with the revision of ANSI Z39.48-1984 and to support the production and distribution of an information packet about the standard. The information packet will include a cover letter, the ANSI standard for uncoated paper, information about NISO, and a list of manufacturers of permanent paper in the U.S. It will be distributed to 2,400 U.S. publishers and journals. The purpose of the kit is to provide an information link between alkaline paper producers and publishers, thus encouraging increased purchase and use of permanent paper.

Recent efforts to convince the U.S. Government Printing Office (GPO)—the largest printer in the U.S.—to use permanent paper for select documents have been positive. On October 15, 1987, the Depository Library Council, an advisory committee to GPO, unanimously passed a recommendation urging the Public Printer to convey to the Joint Committee on Printing the Council's concern for the archival value of government publications. The Council further recommended that a specification for paper permanence be formally adopted by the Joint Committee on Printing, and that following the adoption of such a specification the Public Printer notify government publishers of the availability of permanent paper and the benefits of its use. Lastly, the Council recommended that GPO encourage the use of permanent paper for publications with enduring research value.[4] If the Joint Committee on Printing were to set a strong preservation precedent by establishing a policy that recommends the use by GPO of permanent paper, the positive impact on collection preservation in all U.S. depository libraries and on other libraries and archives nationwide would be major.

Other efforts to disseminate information about permanent paper are also taking place. For example, a new newsletter, *Alkaline Paper Advocate*, is planned. The intended audience is a large cross section of individuals and groups involved in paper conservation, preservation, production, and use. The newsletter will contain updates on future standards, lists of producers and suppliers, and announcements of meetings, conferences, and workshops related to the production, use, and procurement of alkaline paper. It will also provide a forum for exchange of information among librarians, publishers, and paper industry personnel.[5]

[*Mark Roosa, Library of Congress*]

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[4] Works of enduring research value are defined in ANSI Z39.48-1984 to include important works of fiction and non-fiction, scholarly publications, monographs, and reprints, collected editions, encyclopedias, dictionaries, bibliographies, directories, abstracts, and other reference works that require permanent retention; publications intended primarily for the library market; and titles not appropriate for transfer to other formats, government sponsored research studies, almanacs, census data, and survey maps.

[5] Information about the newsletter may be obtained from Ellen McCrady, 320 E. Center, Provo, Utah 84601, U.S.A.

WHY GPO SHOULD USE ALKALINE PAPER

Linda Nainis, Georgetown University Law Library
Charles R. Kalina, National Library of Medicine
Jan Merrill-Oldham, University of Connecticut Library
Carolyn Morrow Manns, Library of Congress

(The authors also wish to acknowledge that many other people contributed their expertise and advice to the creation of this paper).

Abstract: Perishable acidic paper contains the seeds of its own destruction and has created an enormous preservation problem in libraries. In contrast, alkaline paper offers economic, technological, and societal benefits which have been recognized by scholars, professional organizations and Congressional leaders. The Government Printing Office should be asked to investigate how it can help to stop the brittle book problem at its source by using alkaline paper for government publications.

Background of the Problem:

Most printed matter published since the mid-nineteenth century is destined to disintegrate within a lifetime. Industrial manufacturing processes made it possible to meet the exploding demand for paper, but introduced residual acids that cause paper to rot slowly from within, and to crumble over time. Use of acidic paper has inadvertently contributed to the preservation problem that is facing society today. Publications as recent as fifty years old are affected. The number of brittle volumes in libraries, with pages that will break apart as they are turned, is now estimated to be 76 million and expected to rise to 114 million in the next twenty years as collections age. There is really no hope of saving them all. Several major research libraries report that more than one fourth of their books are already so fragile that they are nearly unusable.

Government documents are no different. They are deteriorating at a comparable rate. The records of the government, which should be an enduring chronicle of the nation's culture and activities, are becoming so embrittled that they may soon be useless. Many of the publications at risk are primary research titles, such as legislative history documents, cumulations of judicial decisions, and statistical compendia. Because many government titles are issued in parts over time, the progression of embrittlement is obvious is library backfiles, particularly among volumes published before the 1920s. For example, an examination of *U.S.Reports* in one library revealed that more than half of its 468 volumes are brittle. Similarly, decades of census publications, map series, and reports of research and exploration are crumbling. Tens of thousands of important document sources are becoming unreadable to future generations of scholars.

At present, books published between 1860 and 1940 are most affected; however, most modern paper is destined to become brittle over time. Preservation specialists are employing a number of approaches to try to preserve the content of brittle books. The costs of converting text to another format are high. They can outstrip the resources of any single library and require that choices be made concerning which brittle books to preserve.[1]

Solving the Problem for the Future

By far the most promising and forward-looking approach is to use alkaline paper for new publications, thus stopping a potential problem at its source. Over the last three decades, alkaline paper has become available in commercial quantities and at competitive prices. Publications produced on alkaline paper will not need deacidification or microfilming, thereby saving money for libraries and the government in the long run. They will last for centuries rather than decades in ordinary library use, without significant deterioration.

It is illogical to continue to print on acidic paper stock. The scope of the embrittlement problem is already too staggering to permit indifference towards issues that we can influence. Publishers and printers should be persuaded to use alkaline paper for the printing of new books, in order to stem the flow of acidic paper into our libraries.

The U.S. Government is the largest publisher in the United States. As the world's largest printer, the Government Printing Office (GPO) can play a leadership role by phasing out the use of acidic paper. This modification promises enormous long-term benefits for scholars, libraries, publishers, and the public at large. First, using alkaline paper will increase the longevity of a large proportion of the yearly output of important printed materials. Second, in extending the life of documents, GPO will better fulfill its mission of providng a permanent, public archive of government publications to depository libraries. Third, and perhaps most significant overall, GPO will increase the United States market demand for alkaline paper production, with the large quantities required for government printing. This will stimulate more paper manufacturers to convert to a potentially cheaper and environmentally cleaner alkaline process.

Economic and Quality Advantages of Alkaline Paper

It does not cost inherently more to produce a book on groundwood-free, chemical wood pulp paper that is alkaline than it costs to produce a book on comparable quality paper that is acidic.[1] The papermaking industry is slow to change because it is production-oriented, employing an efficient but conservative technology and having a high level of capital investment in the existing plant. However, in the long run, there are economic incentives and societal benefits associated with making alkaline paper that should ultimately make it more efficient to manufacture.

The alkaline process reduces water consumption and facilitates waste treatment. It adapts more readily to environmental law requirements. It is cleaner and, on balance, less corrosive to machinery, reducing down-time. It saves energy, particularly in the drying cycle. It reduces material costs because a greater proportion of lower cost fillers, such as calcium carbonate, can be used. Such fillers are often cheaper than the wood fiber and high-brightness pigments for which they can partially substitute. The paper can be made stronger so that lighter alkaline paper can be used in place of heavier acidic paper. With greater flexibility possible in the composition of their product manufacturers can tailor it to accommodate a broad range of aesthetic requirements and production qualities

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There is no evidence that the papermaking industry could not accommodate the potential demand for use of alkaline paper in the foreseeable future, were the demand to be expressed. Thirty U.S. mills have at least one alkaline fine-grade paper machine, and at least thirty more are in the trial evaluation state. Alkaline methods are usually adopted in new paper plants. The most striking proof that acid-free paper is available and affordable is that some publishers are already using it and do not even know it.

The alkaline process in book paper manufacturing is here to stay. It has not grown as rapidly as many had predicted, or would have wished, but it will continue to develop. The driving forces toward future growth are Environmental Protection Agency standards on water pollution, cost of fiber and fillers, efficiency of the process, need to reduce fresh water consumption, and changing energy expenses.

Marketing Advantages

As evidence that alkaline paper has marketing appeal, it is notable that two reprinters of law materials offer permanent paper editions of *U.S. Reports*. These companies are printing the same text and making volumes available as quickly as the GPO version, but on alkaline paper. The primary marketing attraction of this effort is the better-quality alkaline paper, which shows the reprinters' sensitivity to librarians' concerns about paper embrittlement. Obviously, these reprinters believe that their customers are sufficiently interested in alkaline paper to buy their edition of *U.S. Reports*, in preference to the GPO edition.

What is the Government's Role?

Why should it be necessary for a private reprinter to take over what should be the responsibility of the Government Printing Office, government agencies, and legislative or judicial bodies to produce high-quality, long-lasting government publications? Why, when Congress is being asked by the National Endowment for the Humanities, the Library of Congress, and other concerned units of government to help fund efforts designed to conquer the brittle book problem through microfilming, deacidification and other preservation programs, should its own printing office exacerbate the problem by continuing to print volumes on acidic paper? It seems well within the mission of GPO to use alkaline paper for printing the permanent records of government.

The irrationality of continuing to print on acidic paper has been recognized by members of Congress. William H. Natcher, Chairman of the House Subcommittee on Labor, Human Services, Education and Related Agencies, noted Congressional concern about the problem of paper deterioration in his keynote address at the January 27, 1987 National Library of Medicine hearing on the use of permanent paper for biomedical literature. He expressed the belief that using more permanent paper in publications can serve as preventive medicine and reduce the embrittlement problem significantly. Senator Bentson introduced a report on the hearing into the April 10, 1987 *Congressional Record*. He reiterated concerns about the deterioration of scientific literature and identified use of permanent paper as a way of stopping much of the preservation problem at its source.

On March 3, 1987 a hearing was held before the House Subcommittee on Postsecondary Education on the brittle book problem, with Hon. Pat Williams presiding, to discuss the progress of national microfilming programs. David C. Weber, Director of Stanford University Libraries, Carole F. Huxley, Deputy Commissioner for Cultural Education in the New York State Education Department, and Daniel J. Boorstin, Librarian of Congress, all pointed out the long-term advantage of ordering paper for government printing that does not carry the seeds of its own destruction.

At the July 14, 1987 confirmation hearings of Dr. James H. Billington as Librarian of Congress, Senator Pell included the issue of how to get the Government Printing Office to use alkaline paper as one of a list of challenges clamoring for early attention.

Why Does Acidic Paper Persist?

Why, when there are so many advantages associated with the use of alkaline paper, do GPO and other major publishers continue to use acidic paper that is destined to deteriorate? One answer is that until recently many publishers and printers were simply not aware of the ongoing disintegration of large portions of the nation's, and indeed our civilization's printed record; or of the high cost of preserving information recorded on acidic paper.

Publishers have not demanded alkaline paper vociferously enough for paper mills to identify it as a marketable product line, although most would probably agree, at least in principle, that use of alkaline paper is a good thing. Minor adjustments, such as achieving compatability with inks and dyes originally developed for use with acidic paper, have not been an insurmountable problem, yet few publishers – with the exception of the American university presses – have made a commitment to alkaline paper for scholarly publications.

Accordingly, marketing efforts have not targeted publishers whose products would be expected to have a priority for permanence. Alkaline paper is marketed and selected on other virtues, for the most part, such as superior aesthetic characteristics and production properties.

Furthermore, the decision to switch from acid to an alkaline process is now often based on mill economics, because of the advantages of the alkaline process to the manufacture of paper as a commodity. It is notable that not all of the alkaline papermaking capacity is directed at paper for book publishing. Some of it is devoted, for example, to making industrial paperboard, non-woven fabrics, milk cartons, and converter stock (such as paper for envelopes). Currently alkaline paper is a standard supply item; however, of paper produced for book publishing purposes, only 25 percent happens to be alkaline.

Increasing consumer knowledge of the importance of using permanent paper for book publishing, and the creation of guidelines for the procurement of alkaline paper are important prerequisites to increasing demand. The first steps are being undertaken by responsible scholarly, professional, and standards-setting organizations.

Standards for Permanent Paper

In 1984 the American National Standards Institute approved a standard for permanent paper for printed library materials, which sets forth reliable specifications for purchasers of high-quality book paper. The standard stipulates that permanent paper must have a minimum pH of 7.5, must have at least a 2 percent alkaline reserve as a buffering agent, and that the paper stock must include no groundwood or unbleached pulp. In addition, to ensure reasonable durability of

the finished paper, the standard specifies a fold endurance[1] of at least 30 double folds, and a minimum tear resistance.

In addition, the American Society for Testing and Materials (ASTM) has adopted standards for permanent bond and ledger papers, manifold (carbon copy) papers, papers for office copying machines, and file folders, and is in the process of issuing a "Standard Guide for Permanent Offset and Book Papers."[4] All of these ASTM publications set three levels of quality, the highest of which is "maximum permanence." The four standards specify a minimum pH of 7.5, and the Standard Guide suggests a minimum pH of 6.5, for papers in this highest category, the only one suitable for materials to be retained in libraries and archives for an indefinite period of time.

Government agencies desirous of using acid-free paper had until recently no officially promulgated Joint Committee on Printing (JCP) specification to which to refer, although an unofficial standard has been in draft form for use on a case-by-case basis. A governmental policy on the use of permanent paper could serve as a model for all publishers. Happily, within the next several months the JCP plans to officially adopt a specification for alkaline paper. This specification incorporates the paper quality criteria identified in the ANSI permanent paper standard. As with all JCP specifications, it will include a "use" statement. This statement will suggest the kinds of publications for which permanent paper is suited.

Publications That Should Be Printed on Alkaline Paper

Publications that have enduring value should be printed on alkaline paper. The ANSI standard describes several types of publications which are appropriate candidates for alkaline paper: (1) important works of fiction and nonfiction; (2) scholarly publications, monographs, and reprints; (3) collected editions; (4) encyclopedias, dictionaries, bibliographies, directories, indexes, abstracts and other reference works that require permanent retention; (5) publications intended primarily for the library market; and (6) titles not appropriate for transfer to other formats. Government-sponsored research studies, almanacs, census data, and survey maps qualify as having enduring value within these definitions.

Because of the legal importance of government publications, additional categories of material should be included: (1) publications mandated by law; (2) annual reports; (3) legislative history sources from the House and Senate (documents, reports, hearings); (4) permanent cumulations of judicial, legislative or administrative decisions, orders and opinions, rules and regulations; (5) yearbooks, annual statistical reports; (6) treaty series; (7) advisory committee reports; (8) proceedings of conferences, institutes and advisory boards; and (9) reports, decisions, and conferences concerning domestic and international arbitration. In conclusion, many categories of government publications have permanent value. They should be published on alkaline paper.

Consumer Information Now Available

To increase the awareness and to address the needs of publishers and printers, including GPO, who may want to use alkaline paper but who do not know a great deal about its availability, the National Information Standards Organization (NISO) Z39 Committee is developing an information kit. The kit will include a list of manufacturers who produce alkaline paper that meets the ANSI standard. The packet will be available before the end of calendar year 1987.

Additionally, the American Society for Testing and Materials (ASTM) is preparing consumer guidelines covering all aspects of the use of permanent paper, including for book publishing. Responding to the complaint that reliable industry statistics on the subject are not now available, the American Paper Institute is considering the inclusion of data about alkaline papermaking in future industry surveys. This information will greatly assist GPO and other potential buyers of permanent paper by providing them with information about the producers and distributors of all kinds of alkaline paper products.

How GPO Can Expand Its Use of Alkaline Paper

There are a number of ways in which GPO could take a more active role in promoting the use of alkaline paper for government printing. It is desirable to effect the largest-scale conversion possible, in order to help create a market demand that will stimulate more paper mills to convert to an alkaline process; provide an example for private publishers; and benefit scholars, librarians, the Federal and private funders of preservation programs, and society at large.

GPO could start by advising agencies, judicial bodies, and Congress of the availability of competitively-priced alkaline paper, its appropriate uses, and its benefits. This is a first step, easily taken by the Public Printer, which could be framed as a memorandum offering an additional product line. Such an approach may have good public relations potential, but it cannot be relied upon to have uniform results.

A more proactive approach would be for GPO to publish on alkaline paper a "library edition" of publications for depository libraries. At the very least, permanent editions on alkaline paper should be available to regional depository libraries and libraries not served by a regional depository, because these libraries are directed by title 44 of the *U.S. Code*, section 1911 to "retain Government publications *permanently* in either printed form or in microfacsimile form. . ." (emphasis supplied). It is clearly within the intent of the law to encourage the Public Printer to take such an action, because title 44, section 1914 empowers the Public Printer to "use any measure he considers necessary for the economical and practical implementation of this chapter on the depository library program."

As important as it is for depository libraries to receive high-quality, long-lasting documents for public use, arguably other libraries and users of government publications have an equally legitimate interest in purchasing better quality publications in place of the acidic paper publications now produced by GPO and a myriad of other publishers. GPO might offer them a choice of paper (acidic or alkaline) and let the buyer decide how long the publication has usefulness. If there is a cost associated with better paper, it could be passed on to the purchaser.

As an interim measure, GPO might limit the use of alkaline paper to certain categories of publications rather than upgrade the standards for all items on the classified list of government publications for selection by depositories. Selection could be compatible with the guidelines presented in the "use" section of JCP's alkaline paper specification. All editions of titles in these categories might be printed on alkaline paper, since they have recognized permanent value, thereby extending the lifespan of highly significant titles and extending the benfits to all purchasers.

A more expansive approach would not necessarily be more expensive. GPO could transfer to alkaline paper all titles already published on high-quality, but acidic, chemical wood pulp paper. This solution would entail no extra cost for materials. A cost differential would arise only if the relatively small number of publications currently published on ground wood pulp were upgraded; for such titles, it may be desirable for library editions to be provided. It should be possible to project the quantity of paper and the consequent costs involved in such a proposal, because the Public Printer submits to the Joint Committee on Printing, at the beginning of each session of Congress, estimates of the quantity of paper of all descriptions that will be required for public printing and binding during the ensuing year, as mandated by section 508 of title 44 of the *U.S. Code*.

The problems associated with any of the purposefully limited approaches are practical as well as conceptual. Unnecessary costs may be incurred when the same text is printed in duplicate editions. Even an approach limited to certain categories of publications may, by increasing the types of paper kept in inventory, involve higher costs. The selection of publications for special editions and estimates of the number needed may appear reasoned when first made, but realistically it is not possible to foresee who in a hundred years might be interested in what information, where, and for what purpose; or to assure that the information will be available under the proper circumstances. Ultimately, universal use of alkaline paper might be a reasonable goal for GPO to pursue. Implementation could be accomplished in phases. Should demand for alkaline paper begin to outstrip supply, procedures of varying formality could be devised to alert manufacturers to the situation, in support of market signals that would also undoubtedly begin to emerge.

Recommendations

On the available evidence, it appears to be advantageous for the Government Printing Office to take every appropriate action to substitute permanent, alkaline paper for acidic paper in printing the publications of the Federal government.

Representatives of the depository library community have requested that the Depository Library Council urge the Government Printing Office to explore this matter in depth, taking into account quality, economy, market, and other relevant factors; and to consider ways that responsibility for such a program could be assumed within a reasonable period of time. Following its thorough investigation, the Government Printing Office should be requested to report its findings including any considerations that place the reaching of these objectives outside its authority to act. Appropriate complementary avenues might then be pursued to further the goal of increasing use of permanent paper for government publications.

References and Footnotes

[1] Microfilming, photocopying onto alkaline paper, deacidification and other methods of stabilizing paper, and electronic storage of images are the main preservation options currently being used. Document replication by microfilming is the most practical method now available. Its cost is high, typically $65 for a 300-page monograph, and microform use is not popular with readers. Substantially lower costs are projected for mass deacidification, useful only when paper is not yet brittle. At this time the choice of technologies is not completely resolved. The National Library of Canada currently deacidifies 40,000 volumes yearly using a non-aqueous liquid process. The Library of Congress is developing a sophisticated gaseous technique that will be capable of treating one-half million volumes annually, beginning in the 1990s. Even with that capacity, it would take several decades to deacidify the Library's collection. Electronic media have their own complex set of degradation problems over a useful life currently estimated to be approximately 20 years, and involve questions concerning hardware and software compatibility with future technology.

[2] There is one exception. Paper made from mechanical wood pulp such as newsprint is consistently cheaper than chemical wood pulp paper. Another reservation is that there is only partial substitutability of mechanical and chemical pulp papers for specific end uses.

[3] ANSI Z39.48-1984, Permanence of Paper for Printed Library Materials. Available from American National Standards Institute, 1430 Broadway, New York, NY 10018. This standard is being revised to include coated stock. Although standards for permanence of coated papers are not yet available, a coated paper with an alkaline process core would be expected to qualify in the interim as permanent. Modern coating compositions tend to be alkaline in any case. It is not known at this time to what extent, if any, alkaline coatings may affect the permanence of acidic paper.

[4] ANSI/ASTM D 3290-86, Standard Specification for Bond and Ledger Papers for Permanent Records. ANSI/ASTM D 3208-86, Standard Specification for Manifold Papers for Permanent Records. ANSI/ASTM D 3458-85, Standard Specification for Copies from Office Copying Machines for Permanent Records. ASTM D 3301-85, Standard Specification for File Folders for Storage of Permanent Records. All available from ASTM, 1916 Race Street, Philadelphia, PA 19103.

A World of Knowledge
for the Nation's Health

November 1988

FACT SHEET

THE USE OF PERMANENT PAPER FOR BIOMEDICAL LITERATURE

A fundamental responsibility of the National Library of Medicine is to preserve permanently the content of books, periodicals, and other library materials pertinent to the biomedical sciences. The Library devotes significant resources to the preservation of the national treasure of its collection by microfilming of deteriorating documents, conservation of rare and valuable items, and research into electronic storage of images.

A major threat to the survival of the collection published since the mid-nineteenth century is the deterioration of paper caused by residual acids introduced into it by paper making processes adopted at that time. Acid attacks and weakens the molecular links of cellulose, the main component of all paper, causing paper to deteriorate from within. Without expensive efforts at preservation, the majority of literature in existence today on library shelves across the nation is destined to become brittle and to crumble over the period of a lifetime.

Technology which made it possible to meet the rapidly expanding demand for paper following the Industrial Revolution inadvertently contributed to the preservation problems of today. A hundred years later, paper making processes which employ alkaline chemistry have begun to come into use. Paper so produced is acid-free. Acid-free paper will last for centuries rather than decades in ordinary library use. It is now available in commercial quantities and at competitive prices.

The printed word is expected to remain the premier means for transmitting knowledge for the foreseeable future. It is not responsible to publish material of enduring value on acidic paper when it is known that its fate is to self-destruct. It is inefficient and illogical to continue to apply costly, labor-intensive remedial measures to volumes on perishable paper when the problem can be prevented. The preservation policy adopted by the Board of Regents of the National Medical Library notes that much of the preservation problem can be stopped at its source by publishing on permanent, archival media, such as acid-free paper, that are not predisposed to rapid deterioration. It also states that in order to lessen the need for preservation treatment of new publications, the Library shall actively encourage the publishing industry to use more permanent materials in the production of biomedical literature.

In early 1987, some one hundred professionals concerned with all phases of the creation and use of biomedical literature joined in a forum held at the National Library of Medicine to explore the problem of paper deterioration, the aesthetics, economics, and manufacture of permanent, acid-free paper, and to foster positive action in its use. As a result of their recommendations, the Library has convened a Permanent Paper Task Force of commercial and academic press and learned society publishers, of editors, authors, paper manufacturers and distributors, printers, librarians, and preservationists.

The goal of the Task Force is to develop a plan to encourage and guide the increased use of acid-free paper for biomedical literature and to explore ways to effectively implement the plan. Task Force contributions to the resolution of the problem of acidic paper in biomedical literature should ultimately facilitate preservation of the printed record also in fields of scholarly endeavor other than biomedicine.

(over)

The Task Force plan strategies include identification of principles for permanent paper use, of mechanisms for their application in the production of biomedical publications, and of suitable standards in the making and use of permanent paper. The Task Force serves as an active resource for information about permanent paper. It seeks to increase the awareness of publishers and printers about the problem of document deterioration and about its solutions, to help authors and editors with their concerns about making their work last, to alert professional societies to the need for the permanence of their publications, and to interest the paper making industry in the scope and requirements of the scientific literature paper market.

The volume of domestic writing and printing paper now produced alkaline could accommodate increased demand for use in scientific publications, even were the demand to be more forcefully expressed. That segment of the publishing industry represents the market for only a small proportion of the fine paper production. Furthermore, alkaline paper making capacity is in use for making a variety of other kinds of paper. Not all of it is now directed at publication needs.

The driving forces are present for a continued, gradual adoption of alkaline paper making by paper manufacturers. There are advantages in the production of acid-free chemical pulp paper. The process reduces water consumption, facilitates waste treatment and compliance with environmental controls, saves energy and materials costs, and is cleaner and, on balance, less corrosive to machinery than acid-based manufacturing processes.

The use of acid-free paper in publications is the preventive medicine for reducing the problem of their deterioration.

For further information please contact: Special Projects Officer, National Library of Medicine, 8600 Rockville Pike, Bethesda, MD 20894. Phone: (301) 496-0592

American Library Association

Resolution on Use of Permanent Papers in Books and Other Publications

WHEREAS, It has been known for at least three decades that residual acids in most paper produced since the mid-nineteenth century have drastically reduced the life of books and other publications and documents; and

WHEREAS, The serious deterioration of the holdings of our libraries and archives has been well documented by several research libraries and archives in the United States; and

WHEREAS, It will require expenditures of hundreds of millions of dollars over the next several decades to salvage even the most essential materials by replication on microfilm or archival paper, and to prevent deterioration by deacidification; and

WHEREAS, This problem can be stopped at its source by the use of readily available alkaline paper with a prospective life of several hundred years; and

WHEREAS, Standards for permanence of uncoated paper have been promulgated, to wit:

American National Standards Institute ANSI Z39.48-1984	Permanence of Paper for Printed Library Materials (uncoated)
ANSI/ASTM Standard	D3290-86 Bond and Ledger Paper for Permanent Records (Type I, maximum permanence)
ANSI/ASTM Standard	D3208-86 Manifold Paper for Permanent Records (Type I, maximum permanence)
ANSI/ASTM Standard	D3301-85 File Folders for Storage Permanent Records (Type I, maximum permanence)
ANSI/ASTM Standard	D3458-85 Copies from Office Copying Machines for Permanent Records (Type I, maximum permanence); and

WHEREAS, The standard for permanence of coated paper is in preparation by a Committee of the National Information Standards Organization; and

WHEREAS, The American Library Association Council adopted in 1980 a resolution from the Resources and Technical Services Division affirming the need to to move toward the production of volumes free from self-destructive substances for all texts of lasting usefulness; and resolving that the Center for the Book in the Library of Congress be requested to call together book manufacturers, papermakers, publishers, and commercial binders to encourage that they join in a cooperative effort to urge the production of books that will endure as long as they are needed; and

WHEREAS, The Board of Regents of the National Library of Medicine in February 1986 adopted a policy of actively encouraging the publishing industry to use permanent paper in the production of biomedical literature; and

WHEREAS, The Depository Library Council to the Public Printer of the United States on October 16, 1987, adopted a recommendation that permanent paper be used for Federal government publications of enduring value; and

WHEREAS, The National Information Standards Organization is writing to all American publishers to urge the use of paper meeting ANSI Standard Z39.48-1984 for the printing of publications of enduring value; now therefore, be it

RESOLVED, That the American Library Association urge all publishers to use uncoated paper meeting ANSI Standard Z39.48-1984 for publications of enduring value, and coated paper that is alkaline and can be expected to meet a similar standard for permanence; and to include a statement identifying publications using such paper on the verso of the title page of a book or on the masthead or copyright area of a periodical publication, and in catalogs, advertising, and bibliographic references; and, be it further

RESOLVED, That the U. S. Congressional Joint Committee on Printing be urged to adopt standards for permanent papers and encourage Federal government agencies to use such paper for publications of enduring value; and that the appropriate agencies of State and local governments be urged to adopt similar policies; and, be it further

RESOLVED, That the following organizations among others are commended for their leadership in researching and promoting the use of permanent papers for future additions to our heritage of knowledge: the National Endowment for the Humanities for financing research and preservation activities; the National Historical Publications and Records Commission, the Council on Library Resources and associated groups for sponsoring research and promoting the use of permanent papers; the Board of Regents of the National Library of Medicine and the Depository Library Council for their recent recommendations; the Library of Congress and other research libraries for their preservation activities including the quantification of the extent of the deterioration problem; the National Information Standards Organization and the American Society for Testing and Materials for developing technical standards for permanent record papers for various uses; the Technical Association of the Pulp and Paper Industry for developing methods for testing characteristics of paper; and those American publishers, especially many university presses, who have already adopted a policy of using permanent paper in their publications; and, be it further

RESOLVED, That copies of this resolution be distributed to the appropriate government and private organizations.

Adopted by the Council of the
American Library Association
San Antonio, Texas
January 13, 1988
(Council Document #34)

Alkaline Papermaking at Simpson-Plainwell Paper Co.

by George Lawton*

Simpson-Plainwell Paper Company acquired its present name, the latest in a long line of names, in December, 1987, when Simpson Paper Company of San Francisco purchased this mill (located in Plainwell, Michigan, about 20 miles north of Kalamazoo) from Chesapeake Corporation.

This mill has been in existence for 102 years. The products produced over the years span the gamut of paper grades--brown paper, newsprint, uncoated printings, coated printings, colors and technical specialties are just a part of the product lines at one time or another. There have been many owners--Michigan Paper Company, Hamilton Crocker, Weyerhaeuser, Philip Morris and Chesapeake, to name the most recent ones. We are happy to be a Simpson mill now. We believe this acquisition will be beneficial to the corporation as well as to the industry in general, the state and community, and most of all to the employees at Plainwell.

The present grade structure has two main parts: high quality printing papers, both coated and uncoated; and products for the pressure sensitive label business. My subject concerns mostly the printing paper side of our grade structure. The mill is equipped to produce about 65,000 tons per year of printing paper grades on our three machines. The majority (45,000 tons) are coated on our No. 18 paper machine, which has a two-side trailing blade coater installed on it. We make Premium No. 1, No. 1 and No. 3 grade coated papers. Some are matte finished and some are gloss. In addition, we make a very nice enhanced offset called Satin Kote on our No. 16 P.M. Our No. 17 P.M. is devoted to the pressure sensitive business.

Both No. 16 and No. 18 P.M. are fully alkaline and have been so since 1982. "Alkaline" to us means using $CaCO_3$ as a filler, using a synthetic sizing agent and operating at around 8 pH. We use no alum at all in the mill.

It is important to realize that Plainwell uses certain products for historical reasons and because they work for us. We have not trialed all the alternate products. In many cases we have not tried any alternate products. So no one should look to us for endorsements.

Plainwell's Approach to the Conversion

The mill's philosophy about going alkaline was to do it as easily as possible, to change as few things as possible at once, and to allow the process to guide us to more optimal levels of operation, rather than force the operation to accept a new process.

The big question everyone asks is this: Is it hard to go alkaline? The answer is simple: YES AND NO. How hard

*Technical Director, Simpson-Plainwell. At the time of Plainwell's conversion to alkaline papermaking, in 1982, the author was Manager for Technical Operations for Plainwell Paper Company. This paper was presented at the 32nd Annual Pulp and Paper Conference, sponsored by the Michigan Division of PIMA, the Kalamazoo Valley TAPPI and the Western Michigan University Department of Paper and Printing, Science and Engineering, in March 1988 in Kalamazoo.

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Alkaline Paper Advocate

do you want to make it? Do you have lots of technical staff hanging around with not much else to do? Then you can make it as hard as anything. You can run multiple paper machine trials, repeated field evaluations and several printer consultations. Or, if you are strapped for people, time, money and knowledge, you can just go. All you need is a motivation, some management backup and a few (not too many) supplier experts who really want to sell you something.

The latter way is sort of the way we did it in 1982. Our motivation was simple: We had a badly screwed up acid wet end system. We used way too much alum and yet we still couldn't control pH. We added lots of rosin-size, but we couldn't count on getting the size test we wanted. We had deposits in the wet end, plenty of holes, lots of breaks, lots of broke, lots of down time and a few customers who were putting up with us. Much of the trouble grew out of replacing No. 18 P.M. with a brand new machine (same width, higher speed) in late 1980. 1981 was one amazing year. Just about everything that could be a disaster was.

There was another motive for going alkaline. We knew that all the high quality coated paper producers--the ones we wanted to emulate--were already alkaline in their high grade lines. We wanted to be a copycat, we wanted Plainwell to be equal to the best, so being alkaline was a natural and necessary step.

The choices came down to this: Should we work very hard to fix up the alum-rosin approach and then, sometime later, go alkaline, or should we just go alkaline? I argued for the latter approach, and the front office backed me up. Why not? It could hardly have been worse.

Since we didn't have much staff, much money or very much time, we took the easy approach. As quickly as possible, and as simply as possible, the mill went alkaline. We did run some trials. We did involve the suppliers and we did keep everyone informed. But we did just go, and we did just stay, alkaline, regardless of what else happened.

Trials

The switch on No. 18 P.M. was preceded by three trials of increasing length. Each trial had a specific goal.

The first trial was in October 1981. It was intended to be a 24-hour trial on a specific grade--our premium No. 1 matte line called Kashmir. The trial plan called for a Monday morning startup. We were supposed to shut down about 6:00 in the morning, boil out the machine and clean out the chests, bring in fresh furnish with $CaCO_3$ in it and start up on 146-lb. coated two side basis weight. We had experts in from all the critical suppliers--carbonate, sizing, retention and biological--for advice. Everything was in place. The only thing was, the machine lost a wire on Saturday. Since they were already down, the manufacturing people went ahead with the boilout. Then they ran ahead of schedule. So when I came in Monday morning at six, they were already making the order we were going to start up on. I knew I wouldn't get this opportunity again soon, so I decided to switch anyway. I really didn't know you can't do that.

We stopped feeding alum and rosin-size. We put soda ash in the chests to raise the pH. We started adding calcium carbonate. I stood on the slice walkway and watched. A technician kept me up to date on the pH. As the pH increased towards 7, the formation on the wire got worse and worse. It finally looked like someone was throwing handfuls of stock on the wire. At about 7 pH things started to get better. The formation improved and the paper became saleable again. We never broke down, we made about 1½ reels of broke (maybe 15,000 pounds), and then we settled into the new conditions like they were normal. Of course, we never told the customers or the Sales Department that we had made a switch on this order. The paper printed just fine.

The second trial was intended to show that alkaline paper is stronger than acid made paper. We had made the cover for a major annual report soon after the 1980 rebuild, which gave the printers a lot of problems with the sheet delaminating during a flying splice. We had to make the order again in December 1981, and I wanted to make a tougher sheet this time. Alkaline was supposed to take care of that. We ran three days on a 135 lb. coated two side supercalendered sheet. The systems worked just fine and the paper was OK. The printing went very well also, a month or so later.

The final trial was run for 10 days starting on January 2, 1982. We had spent the Christmas-New Year's week with the mill down for maintenance. We thoroughly cleaned No. 18 P.M.'s wet end system. We boiled out several times, took down almost all the major pipe lines and high pressure cleaned them, and we polished some of the welds.

On start-up, we ran lighter weight paper--60, 70 and 80 lb. coated grades--to prove that it could be done. We were particularly concerned about the biological situation and watched it carefully. We then went back acid, and ran for a week finishing some orders that had been started before Christmas.

The Permanent Switch

On January 18, 1982, Plainwell made the change from an alum-rosin sized, pH 4.5 system to an AKD sized, pH 7.8 system in a permanent way on No. 18 P.M. The change on No. 16 P.M. followed in less than a month.

No. 16 P.M. was changed over because of one characteristic of alkaline $CaCO_3$-filled paper, that everyone should take into account, even if we didn't. When broke containing $CaCO_3$ is reused in an acid system, foam results. In the case of our No. 16 P.M., I was warned by the Superintendent that if the foam in the basement reached the ceiling, he was going to go alkaline right then. I came in one morning to be greeted by his smiling face saying, "Well, the foam got to the ceiling!" Enough said.

Evaluation

During the changeover, we identified eight major goals that we would use for evaluating the process change. Here is the list:

1. Simplify the wet end chemistry.
2. Run a cleaner machine with fewer deposits.
3. Incorporate $CaCO_3$ as a filler to reduce costs.
4. Run a waterleaf (unsized) coating base stock.
5. Improve the retention.
6. Maintain biological control.
7. Use more $CaCO_3$ in coating formulations.
8. Improve waste water treatment plant operation.

It appears obvious that the only cost savings item that could be easily quantified was Item No. 3, using $CaCO_3$ as a

filler. We expected that this item alone would cover any cost increases we might encounter in other areas.

The economic data that are given in Table 1 should be looked on as an example, not as hard facts. There are many ways to disguise data, and some of them have been used here.

Table 1

Comparison of 1981 and 1987 Furnish Component Usage: Both Analysis Methods

	Actual Usage			Components Equalized		
	Percent Acid	Percent Alkaline	Cost Savings	Percent Acid	Percent Alkaline	Cost Savings
Pitch control agent	0	1	($166,693)	1	1	$0
Retention program:						
Cationic (Acid)	0.25	0		0.12	0	
Cationic (Alkaline)	0	0.1		0	0.1	
Anionic (Alkaline)	0	0.04		0	0.04	
Retention aid svgs			$152,228			($407)
Titanium dioxide	4	2	$1,682,168	2	2	$0
Biological control program			($13,845)			($13,845)
Pulp:						
Northern softwood	26	15		16	15	
Southern softwood	22	26		28	26	
Northern hardwood	3	6		6	6	
Southern hardwood	26	31		33	31	
Other pulps	5	3		3	3	
Pulp savings			$974,295			$1,801,907
Fillers:						
Filler clay	10	0		10	0	
Calcium carbonate	0	17		0	17	
Calcined clay	0	0.18		0	0.18	
Filler costs			($869,353)			($869,353)
Defoamer	0.002	0.004	($2,107)	0.002	0.004	($2,107)
Sizing program:						
Alum	4	0		1	0	
Rosin size	0.5	0		0.3	0	
Synthetic size	0	0.3		0	0.3	
Size costs			($155,872)			($284,072)
Pulp weight, lb./ton	1645	1595	N/A	1714	1595	N/A
Total cost savings			$1,600,812			$632,123

The cost savings can be calculated in several ways. The two most important ways involve answering these questions:

1. What is the difference in cost between the way we made paper in 1981 and the way we made it in 1987?
2. What would have been the difference in cost if we had stayed acid and improved all the other cost items?

The data under "Actual Usage" in the table show the answer to Question No. 1. It appears to show that we are saving $1.6 million per year at our current production rate on No. 18 P.M. The pulp figures are the actual percentages we used in 1981 and 1987 in the entire mill. I do not believe the difference in the percentages has anything to do with being alkaline, but the fiber mix would be strongly affected by differences in grade mix.

The Total Cost Savings ($1.6 million) appears to be taken from the savings in titanium dioxide ($1.68 million). While it is true that we are using only half as much TiO_2 per ton now as we did in 1981, being alkaline is only a small part of the reason. Control of usage is a much larger part.

The actual source of the savings is found in the pulp area, where high cost bleached kraft was replaced by calcium carbonate.

The answer to Question No. 2 is more difficult. Since I couldn't really know how we would be making acid paper, I assumed that nearly everything we do now would be mirrored in the acid process. There are a few things--biological control, filler amount, defoamer, and sizing costs--that are specific to alkaline papermaking, so these were not equalized.

Table 1 also shows that with all but these few items equalized there is an overall savings of $632,000 per year at standard tonnage. Most of this is pulp savings, offset by increases in filler and sizing costs.

A review of the impact of alkaline papermaking on the use of the other components, excluding pulp and filler, is in order. A pitch control agent is the next item. We now use it regularly as an insurance against pitch problems. We used to use it only when we had problems. It probably is not a factor in the alkaline versus acid equation. Therefore, I equalized it out.

Biological control probably costs more in the alkaline mode than it would have in acid, but the system is more complex, and again it is hard to say. I left in a small difference. That seems to be the industry experience.

The retention aid program probably would have approximately equalized and is shown that way in the table.

The filler situation is self-explanatory. We can use more carbonate now than we could have used clay, even in an up-to-date acid system. The calcined product is a minor additive for one particular grade, which we did not make in 1981.

Titanium dioxide (TiO_2) has been touched on. I can see no particular reason why our alkaline system would be more efficient at using TiO_2 than a well-run acid system. Therefore I simply equalized it.

It probably takes a little more defoamer to run alkaline, although some people would not agree with that idea. Defoamer is used for more than just keeping the trays free of foam. In our case, defoamer helps control dandy roll spray. We appear to have more of a problem with this factor

in the alkaline mode.

The sizing situation is also self-evident. Synthetic sizes cost more than natural ones. But you can't use rosin at pH 7.8 and you probably wouldn't use AKD at pH 4.5. So they can't be equalized.

Review of Goals

In the process of preparing this paper I reexamined the original goals. I have drawn the following conclusions:

1. Wet end chemistry is really much simpler. There is no need for pH control because the system is stabilized at 7.8 by the $CaCO_3$ and almost always stays right there. There are apparently fewer water-based reactions going on in the wet end. Retention appears easier to obtain.
2. The system is cleaner. No hard alum-based deposits are being formed. The headbox has fewer strings and lumps forming in it. Boilouts are easier, under normal conditions. There is a reduced need for high pressure water cleaning.
3. We use as much $CaCO_3$ filler as we can, consistent with sheet strength considerations. In the cost area, at least, more is better.
4. We have not been able to run a waterleaf (unsized) base sheet. We have to use an internal sizing agent (AKD) to get the paper through the size press. We ran two ASA trials, in the early days of being alkaline. Our conclusion was that AKD was the size we should use.
5. Retention is much greater than it was in the past. Normal first pass total retention values are above 90% on all grades. It should be noted that there is a very real question about how much of this is a function of alkaline conditions. The mill is using a dual polymer system at the present time. This has been in place since December 1982.
6. The biological control system has not changed much from the one we used in the alum-rosin days. The basic slimicide is still the same. Costs are similar. We have never really lost control of the biological situation.
7. We are now able to use substantial amounts of $CaCO_3$ in coatings. While using $CaCO_3$ as a filler is the major cost reason for going alkaline, using $CaCO_3$ in coatings is the major quality reason. This goal, by itself, would have made the switch practical and necessary, even if costs had gone up. The key point is that the competitors are all using substantial amounts of $CaCO_3$ in their coatings.
8. It is not possible to tell whether being alkaline improves or harms the waste treatment situation. We started up major rebuilds in our waste treatment plant in 1981 and 1983 and the facility is so different now that comparisons are impossible. Certainly, alkaline conditions are ideal for some processes such as microorganism growth. But the lack of alum may actually decrease settling rates. As far as I am able to estimate, the difference between the two processes has no cost impact on the waste treatment plant.

Wire Life

No discussion on the conversion process is complete without a mention of wire life. Ground limestone is an abrasive material. If handled improperly on the fourdrinier, it can cause extreme wire wear. However, one can hardly go alkaline without using $CaCO_3$ in some form. The trick becomes learning how to manage the pigment. That is fundamentally a papermaking problem rather than a technical one.

In 1981, using alum-rosin size and filler clay, Plainwell averaged only 32 days per plastic forming fabric on No. 18 P.M. (excluding damaged wires). This was a poor and unacceptable figure and would have been greatly improved as time went by. Remember that this was a new, higher speed machine than we were used to running.

The first year of being alkaline saw an average wire life of 16 days! At current prices that reduction was worth about $900/day in wire costs, including downtime.

On Thanksgiving weekend, 1982, substantial changes were made on the table of No. 18 P.M. to reduce wear. Foil boxes were repositioned so that each was a multiple of nine inches from the next. Several new low-vacuum boxes were installed and several high-vacuum boxes were removed. The covers on the remaining vacuum boxes were changed from a ceramic material to a high density polyethylene material. The wire that was put on after these changes were made ran 92 days. The current average for otherwise not damaged wires is about 80 days.

Many mills would have given up when the wire life deteriorated so significantly. Plainwell did not give up, for two basic reasons. The first was that we had increased our filler loading in the coating base sheet from around 10% to around 17%. At current prices, this is worth more than $4000/day. That made the $900/day wire costs well worth it. The second reason was that we knew we had to be alkaline in order to compete with the best quality coated free sheet makers, all of whom were alkaline already. We had no competitive choice.

The wire life comparison is given in Table 2. Although the data indicate that alkaline operation is more economical as far as wire life goes, we would expect much longer wire life in a well-operated alum-rosin system than we get in our alkaline system.

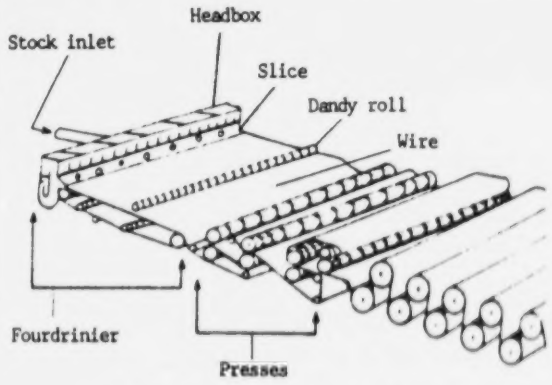
Table 2: Wire Life Study

	1981 (acid)	1987 (alk.)	
Average days per wire	32	90	
Individual wire cost (1988)	$18,000	$29,000	
Tons per wire	5,000	14,000	
Wire cost per year	$200,000	$114,000	
Savings, 1987 over 1981			$86,000

Summary

From Simpson-Plainwell's point of view, we can say that going alkaline was not particularly difficult, because we had clear objectives and a simple plan to get there. We changed as little as we could and we adapted to the changing conditions as that became necessary.

We are not through with the process of change. We have a need to look at some of the alternates that, so far, we have not tried. There are a number of successful approaches being used in the industry that deserve our attention. We have a plan in place to look at a variety of these successful methods over the next year or two. Perhaps in the future I can compare being alkaline in 1987 to another year with even greater savings.



Wet end of a fourdrinier paper machine.

Glossary

AKD - Alkyl ketene dimer, a synthetic sizing agent introduced in the 1950s and used in the form of an emulsion. An AKD with the trade name of Aquapel was used in the first commercial sized alkaline paper, manufactured by the Standard Paper Co. in 1959 for William J. Barrow. It is effective at pH levels above 6 or 6.5.

ASA - Alkenyl succinic anhydride, a synthetic sizing agent; more reactive than AKD, must be emulsified shortly before use & develops its full sizing level more quickly.. Effective at pH levels > 5 and used in alkaline papermaking.

Biological control - Use of biocides, housekeeping measures and good plant design to minimize formation of microbiological deposits (usually slime) in machine systems. In alkaline systems the micro-organisms are usually bacteria rather than fungi.

Boilout - The use of hot chemicals (caustic, acids, solvents, penetrants, dispersents, etc.) circulating through the paper machine and its piping system to dissolve and disperse deposits.

Broke - Paper discarded in the process of manufacture, and usually returned to the repulping unit for reprocessing.

Chests - Mechanically agitated storage tanks for pulp slurries, usually constructed of vitreous tile.

Dandy roll - A roll or cylinder of wire cloth that rides on the wet web of paper and may mark it with a watermark, laid pattern or other design; or which assists in sheet formation.

Dual polymer program - The simultaneous use of two retention aids, one cationic and the other anionic, to flocculate fiber, filler and fines and improve retention and drainage.

Fines - Very short pulp fibers or fiber fragments and ray cells.

First pass retention - The ratio of the suspended solids in the tray water to the percent suspended solids in the headbox, subtracted from one. A measure of how well fillers and fines are being retained in the sheet.

Foil boxes (usually referred to as "foils") - Drainage-inducing elements placed under the fourdrinier wire in the drainage section to assist in removing water from the sheet. The active element is an airfoil shaped scraper blade.

Grade - A type of paper with specific known properties.

P.M. - Paper machine. The paper machines in all of the Simpson Paper Company's mills are numbered in the same sequence. The Plainwell mill has only P.M.s No. 16, 17 and 18.

Pigment - Any inorganic, insoluble material of fine particle size added to the wet end of a paper machine or used as a surface treatment. Generally used for economy, color, brightness and opacity characteristics.

Pitch - A troublesome material originating from the resins in the wood used to make the pulp, which sometimes accumulates on the fourdrinier wire or the press section.

Slice walkway - A platform across the fourdrinier headbox which allows inspection of the table.

Soda ash - Sodium carbonate (Na_2CO_3), an alkaline compound.

Table - The portion of a fourdrinier section where drainage of water from the stock and consolidation of the sheet takes place.

Titanium dioxide - TiO_2, a white pigment used as a filler and in coatings. With its high index of refraction, it is the most effective and expensive opacifying agent available, on a pound-for-pound basis.

Vacuum boxes - Drainage elements in the table which remove water with an externally generated vacuum.

Wet end - Another name for the general fourdrinier section of a paper machine, but extending back to include the piping and equipment of the stock delivery system; that part of a paper machine where the stock is "wet."

Wire - An endless belt woven of plastic or metal for use on the fourdrinier machine; forming fabric.

Major Paper Manufacturers' Prices for Acidic vs. Acid-Free Papers in Selected Paper Grades (as of 2/1/88, $ per CWT)

Compiled by Guy Dresser*
For the National Library of Medicine's Permanent Paper Task Force

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	ACIDIC MILLS									ALKALINE MILLS					
	A	B	C	D	E[1]	F	G[2]	H	AVERAGE	AVERAGE	I	J	K	L	E[1]	H
Coated sheet offset (skids)																
Premium				77.20[3]					77.20	77.21		77.17		77.25		
No. 1 - 70#		75.15							75.15	74.68	75.08	74.55		74.55	74.55	
No. 2 - 70#		68.05		68.00					68.03	68.00	68.00			68.00		
No. 3 - 70#	65.40	65.70							65.55	65.71	65.63	65.63	66.00	65.65	65.65	
Uncoated sheet offset (skids)																
No. 1 opaque - 50#	61.69					59.66	65.10		62.15	58.00					58.00	
Commodity opaque - 50#	51.45		49.35			48.83	53.03	51.00	50.73	53.83			54.10			53.55
Commodity offset - 50#	48.30		45.68			45.68	44.63	45.70	46.00	46.00			46.30			45.70
Coated web offset (rolls)																
No. 1 - 70#					66.15				66.15	64.93	62.50	66.15		66.15		
No. 2 - 60#		54.00		60.65					57.33	58.00				58.00		
No. 3 - 60#	55.50	55.50			55.50				55.50	56.27	56.00	58.80		54.00		
No. 4																
Groundwood free - 50#	55.00	54.50			55.00				54.83	53.25	51.50	55.00				
≤ 10% groundwood - 50#	45.50	46.50	44.90		48.50				46.35	48.50	48.50					
≥ 25% groundwood - 50#	43.65		42.60						43.13	44.50	44.50					
No. 5 - 50%	41.80	39.75	38.75		40.55				40.21	40.55	40.55					40.55

*Allen Press, Lawrence, Kansas
1. Same mill - two locations, one of which is alkaline and the other acid.
2. Mill G will convert to alkaline manufacturing process late 1988.
3. All prices are on a carload basis: 40,000 lbs.

Alkaline Paper Advocate
Abbey Publications, Inc.
320 E. Center Street
Provo, UT 84601

ALK. PAP. ADVOCATE MAY 1988 V.1 #3 P.20

MANUFACTURERS OF PERMANENT PAPER

The following paper manufacturers have indicated that they produce papers meeting the specification of American National Standard Z39.48-1984, Permanence of Paper for Printed Library Materials.

Ecusta Corporation
P. O. Box 200
Pisgah Forest, NC 28768
704-877-2477
Contact: Richard D. Seiler
Staff Technical Service Engineer

Fletcher Paper Company
318 W. Fletcher Street
Alepna, MI 49707
517-354-2131
FAX: 517-356-6327
Contact: Mr. Elbert M. Heath
Manager, Marketing and Sales
Paper: Founder's Opaque

Fraser Paper, Ltd.
P. O. Box 10055
Stamford, CT 06904
203-359-2544
Contact: Leo G. Berinati
Product Manager - Book Papers

P. H. Glatfelter Company
228 South Main Street
Spring Grove, PA 17362
717-225-4711
Contact: Anthony M. Liberatore
Product Manager

Grays Harbor Paper Company
Western Region Manufacturer of Hammermill Papers
P.O. Box 60
Hoquiam, WA 98550
206-532-9600
Contact: Vince Leary
Superintendent of Technical Services

International Paper
White Papers Business
6400 Poplar Avenue
Memphis, TN 38197
901-763-5896
Contact: John H. Peggs
Manager, New Product Development
Paper: Toconderoga Mill Only: Springhill Offset, Springhill Opaque, and Springhill Reprographic papers

James River Corporation
Book Paper
145 James Way
Southampton, PA 18966
215-364-3900
Contact: Eugene E. Coder
Vice President, Sales

James River Corporation
Merchant Paper Sales Division
145 James Way
Southampton, PA 18966
215-364-3900
Contact: Jan Sharpless, Product Manager
Paper: Curtis Brightwater Writing

Miami Paper Corporation
P. O. Box 66
S. Smith Street
West Carrollton, OH 45449
513-865-6033
Contact: James F. Grove
Vice President, Sales
Permanent papers can be manufactured in compliance with NISO's standards upon request.

Mohawk Paper Mills, Inc.
465 Saratoga Street
Cohoes, NY 12047
518-237-1740
Contact: Scott O. Petrequin
Vice President, Marketing & Specification Sales

Monadnock Paper Mills, Inc.
Antrim Road
Bennington, NH 03442
603-588-3311
Contact: Robert C. Larson
Vice President, Sales
Permanent papers can be manufactured in compliance with NISO's standards upon request.

Neenah Paper
1400 Holcomb Bridge Road
Roswell, GA 30076
404-587-8724
Contact: Terry Kinnamon
Director of Marketing
Paper: Old Council Tree® Bond, Neenah N.P. ™ Bond, Neenah® Copier, Avon and Natural White Classic Crest® Writing,Text & Cover

S.D. Warren Company
225 Franklin Street
Boston, MA 02110
617-423-7300
Contact: Robert E. Weeden
Printing and Publishing Product Manager

more ...

Weyerhaeuser Paper Company
200 Grand Avenue
Rothschild, WI 54474
715-359-3101
Contact: Paul A. Schwonke
Manufacturing Manager
Paper: Cougar Opaque, Lynx Opaque, Husky Offset
(produced at Rothschild, Wisconsin mill)

George A. Whiting Paper Company
100 River Street
Menasha, WI 54952
414-722-3351 or 1-800-558-5055
Contact: Larry Riehl
Sales and Marketing Manager

National Information Standards Organization
P.O. Box 1056
Bethesda, Maryland 20817

9/88

ABBEY PUBLICATIONS
Ellen R. McCrady, Editor

320 East Center Street • Provo, Utah 84601 • (801) 373-1598

COMPANIES MAKING ALKALINE OR NEUTRAL PAPER

The paper manufacturers on this expanded list have indicated that they produce acid-free paper, but not all of them have reported compliance specifically with the American National Standard Z39.48-1984, Permanance of Paper for Printed Library Materials.

The companies that are 100%, or nearly 100%, alkaline are marked with an asterisk (*). The list does not include papers made by foreign companies; alkaline papers not used in publishing, printing or office work; or private brands (papers made to order for a distributor or retailer).

Company	Executive Offices	Telephone	Mill Locations
Allied Paper Co.	OH	616/345-7131	MI
Beckett Paper Co.	OH	513/863-3641	OH
Consolidated Papers, Inc.	WI	715/422-3111	WI
Crane & Co.*	MA	413/684-1234	MA
Ecusta Corp.* - Div. of Glatfelter, q.v.		704/877-2636	NC
Finch, Pruyn & Co.*	NY	518/793-2541	NY
Fletcher Paper Co.	MI	517/354-2131	MI
Fox River Paper Co.	WI	414/733-7341	WI
French Paper Co.	MI	616/683-1100	MI
Georgia Pacific	GA	404/521-4000	AR, FL, IL, IN, LA, ME, MI, MS, NJ, NY, NC, OH, OK, OR, PA, VT, VA, WA
Gilbert Paper Co. - Div. of Mead Corp.	OH	414/722-7721	AL, MA, MI, OH, TN, WI, IN, GA
P.H. Glatfelter Co.*	PA	717/225-4711	PA, WI
Grays Harbor Paper Co.* - Subsid. of Hammermill & Rayonier	WA	206/532-9600	WA
Hammermill Papers Group	PA	814/456-8811	AL, NY, PA
Howard Paper Mills	OH	513/224-1211	OH
International Paper Co.	NY	800/541-4141	AL, AR, LA, ME, MS, NY, OR, PA, SC, TX
James River Corp. (Curtis & Fitchburg Divs. & James River Graphics)	VA	800/441-9292	MA
Mead Corp., Fine Paper Div.	OH	513/222-6323	OH
Miami Paper Corp.,* Div. of Cross Pointe	OH	800/543-6670	OH
Midtec, Div. of Repap	Que.	414/788-3511	WI

(over)

Mohawk Paper Mills*	NY	518/237-1740	NY
Monadnock Paper Mills	NH	603/588-3311	NH
Neenah Paper Div., Kimberly Clark Corp	GA	404/587-8000	WI
Nekoosa Papers Inc.	WI	715/887-5111	AR, WI
Newton Falls Paper Mill*	NY	315/848-3321	NY
Parsons Paper, Div. of NVF Co.	DE	413/532-3222	MA
Potlatch Corp., Northwest Div.*	CA	218/879-2300	AR, ID, MN
Potsdam Paper Mills*	NY	315/265-4000	NY
Rising Paper Co., Div. of Fox River	WI	413/274-3345	MA
Simpson Paper Co.	CA	415/391-8140	CA, MI, OH, PA
Simpson-Plainwell Paper Co.*, Div. of Simpson	MI	800/253-1895	MI
Strathmore Paper Co.	MA	413/568-9111	MA
Ward Paper Co.*	WI	715/536-5591	WI
S.D. Warren Co.*	MA	617/423-7300	ME, MI
Byron Weston Co.*	MA	413/684-1234	MA
Westvaco Corp.	NY	212/688-5000	KY, MD, PA, SC, VA
Weyerhaeuser Paper Co.	WA	215/825-1110	MS, NC, OK, OR, WA, WI
George A. Whiting Paper Co.*	WI	800/558-5055	WI

§ Note: These are all the mills in the company. In the case of companies that are not 100% alkaline, some of these mills make nonalkaline paper.

Making Books That Will Last

A Call for Authors to Join The Campaign for Acid-Free Paper

By Barbara Goldsmith

Most of the books published in 1988 will have much shorter lives than those that were manufactured 150 years ago. This is because the pages of most modern books are printed on acid-based paper. Inevitably—barring expensive counter-measures—this paper will become brittle and turn to dust. Things need not be this way, however. Acid-free paper is available. The trouble is that many publishers either are not aware of the problem or have not focused upon it. Authors would do well to raise the consciousness of publishers on this issue, but they, too, seem to be generally unaware of what is happening. Guild member Barbara Goldsmith is a social historian who cares deeply about preserving our cultural heritage, and she stressed the importance of printing books on acid-free paper at a seminar of the Association of American Publishers this past November. Here is her account of the session.

I welcomed the opportunity to speak before the Association of American Publishers last winter. We stand at a watershed moment in book conservation and I felt that all I had to do was get the information to publishers and we could begin to solve the problem. From Charles Dickens to Frank Capra it's always worked; one is given an apocalyptic vision of the future and then returned to the present eager to right the wrong.

I didn't have to go far for such a vision. Right now seventy-six million volumes in major research facilities across our nation are turning to dust. In the Library of Congress over six million volumes—eleven and a half acres of books—are too brittle to read. A recent National Endowment for the Humanities study estimated that it would cost $258 million to preserve on microfilm only three million of these books. This library has invested more than ten million dollars in a plant to deacidify books with diethyl zinc gas at a cost of approximately three dollars to six dollars a volume.

At the New York Public Library, even as ground is being broken for underground temperature and humidity controlled stacks, the equivalent of thirty-five miles of bookshelves contain over two-and-one-half million dying books. One dollar in every five this institution spends goes toward conservation. In their microfilm laboratory there is a two-and-one-half year backup. "When I became a librarian," Vartan Gregorian, the head of the NYPL, remarked recently, "I never thought I'd be involved in triage—who shall live and who shall die."

I explained briefly in my speech the process by which our cultural heritage is dwindling away, how books produced before 1850, made manually from rag stock, are frequently in fine condition. With the Industrial Revolution, however, came a major leap in literacy and concomitantly an increased demand for paper. Machinery and wood pulp have been used in paper manufacture ever since and also aluminum sulphate and alum-rosin compounds that keep paper smooth and prevent ink from running.

For many years wood pulp was thought to be the cause of book deterioration but a quarter of a century ago conservator William J. Barrow determined that alum eventually combines with moisture to produce sulphuric acid thereby igniting slow self-consuming fires of destruction. Many conservators estimate that acid accounts for seventy-five percent to ninety percent of paper deterioration.

New Discoveries

Discoveries about acid-free paper are relatively new. It was only in 1981 that standards were codified by a committee on production guidelines of the Council on Library Resources. [See the Bulletin, June-July 1982, pages 28-30.] Their report stated that in order to be acid-free, paper must have a *p*H factor of 7.5 or higher, be able to resist thirty double folds, be eight-ply tear resistant, and contain no groundwood. The book and periodical publishing industry in its entirety utilizes only one percent of the production of paper. Ten mills can easily supply the entire hard-bound industry with the acid-free paper that will last three hundred years, thereby eliminating the destruction of our cultural heritage and the billions of dollars spent on preservation. Most notably, the price of acid-free paper has proved to be competitive with that of acidic paper in weights of forty or higher which are used for most quality books.

When I'd finished speaking, the moderator of the program, Peter Mayer, chief executive officer of the Penguin group's publishing houses (which include Penguin, Viking, E.P. Dutton, and New American Library) remarked, "If what Barbara Goldsmith says about book deterioration is true, perhaps some of us should look into the matter." The "*if*" stung. I have looked into this and what I say *is* true.

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I will exert every effort to have my future hard-bound books published on acid-free paper. I will urge my publisher to display the infinity sign connoting acid-free paper in these books.

Signed,

Please list your address, phone, and some or all of your books or publications.

At present about twenty-five percent of the publishing industry utilizes acid-free paper to some extent. Farrar Straus and Giroux prints all of its books on acid-free paper, as does David R. Godine of Boston, and most university presses. Harcourt Brace Jovanovich uses it for its Johnson line, Random House uses it for eighty percent of its books. But all too often indifference, apathy, and cynicism are the attitudes that greet this problem. The most obvious reason is that many trade publishers don't believe that acid-free paper is cost-comparable and seem to focus on that.

After the symposium Mayer took me aside and explained that profit margins are so slim that he felt using acid-free paper, even for Viking hard-bound trade books, would be a long time coming, but he did volunteer to help if a publishers' group was organized to look into the matter. I was too taken aback at the time to say that my research showed that one hundred percent of Viking books are currently printed on acid-free paper supplied by the S.D. Warren company (although the Penguin re-prints use a lesser grade of acidic paper). But Mayer is not atypical. Several paper suppliers stated many publishers don't know if their books are printed on acid or acid-free stock and that acid-free rarely was requested on specification sheets.

"You're Just Naive."

Another publisher told me, "You're just naive. Acid-free paper may be comparable on a price list but no one will bother to organize to get it. No one cares, and if lighter weights cost even a penny more—forget it forever." Forever is a long time, time enough for an anthropologist to look back at our period and think it another Dark Age.

What is needed is both a moral commitment to saving our cultural heritage and some practical American publishing savvy on how to go about it. You can't blame publishers alone for the present confusion about this issue. When I began to research this question I discovered that among professionals there's a divergence of opinion that underlines the need for shared information and leadership. For example, of twenty experts (including suppliers, book paper buyers, and publishers) polled in the past month, three said that fine acid-free paper in all weights was cheaper to produce, ten found it generally competitive, five said they thought it was three percent to ten percent more expensive, and two said you couldn't compare them. A major problem is that cost statistics are a forbidden subject. Every TAPPI meeting (Technical Association of the Pulp Paper Industry) starts with the reading of an anti-trust statement which forbids members from discussing prices with anyone. Presumably this caution stems from an anti-trust case on price fixing from a decade ago.

Public and private awareness of this public problem is sadly lacking. In February, I telephoned ten prominent writers to find out if their books were printed on acid-free paper. Not one of them knew. I didn't know either until I became aware of this problem. Now I insist on acid-free paper.

In Europe, in the past six years alone, the manufacture of acid-free paper has been stepped up to fifty percent (ironically using our own 1981 production guidelines), while domestically we manufacture ten percent to fifteen percent acid-free paper. If writers would organize to demand acid-free paper for their books, if publishers purchased it in bulk, then the switch to acid-free paper would become inevitable.

Authors' Help Wanted

Last year marked a breakthrough when a National Library of Medicine Board of Regents hearing was organized to look into the use of permanent paper for biomedical literature. Conservators, publishers, librarians, paper manufacturers, buyers, and distributors all came together to deal with the problem. The Commission on Preservation and Access and the Council for Library Resources is very much interested in developing a program to coordinate efforts among publishers and writers. The New York Public Library is formulating plans to sponsor a symposium dealing with these issues to be attended by conservators, paper suppliers, publishers, opinion makers, and authors—including those who respond to this Authors Guild Bulletin article.

The first step we as writers can take is a relatively simple one—let's start with hard-bound trade books where the prices of acidic and acid-free paper are comparable. Under the infinity sign that denotes acid-free paper is a petition to publishers to make authors' books available for future generations. This petition will also appear from time to time in future Bulletins. One can boost public awareness and save your own work and that of other writers by sending this petition back to the Guild at 234 West 44th Street, New York, NY 10036. Franklin Delano Roosevelt said, "People die, books never die." He was wrong.

47

Making Books That Will Last

The Campaign for Acid-Free Paper Gains Widespread Support

By Barbara Goldsmith

Here is a progress report since my article in the *Bulletin* last winter (pages 34–35) asking writers to petition their publishers to print hardcover trade books on cost-comparable acid-free paper that will last three hundred years instead of an acid paper that will self-destruct in thirty.

The *Bulletin* article stimulated public awareness of the problem and reached the publishing community. Several magazines commented on it. We began to get publisher inquiries.

Subsequently, I organized a committee at PEN (Poets Essayists and Novelists) to petition publishers as we had in the *Authors Guild Bulletin*.

In March of this year Paul Fasana, Andrew W. Mellon, Director of the New York Public Library, and I went to Washington to testify before Sidney R. Yates's (D., Ill.) Committee on Interior and Related Agencies in order to encourage the National Endowment for the Humanities to increase its preservation budget. This resulted in a position paper that the budget for the NEH for preservation would be increased by $23 million annually starting in 1993.

The New York Public Library, of which I am a trustee, decided to take an active part in the leadership of the campaign for acid-free paper. In March of 1989, under the auspices of the NYPL, an advocacy office for acid-free paper and related preservation needs will be opened at the New York Public Library.

At the suggestion of NYPL President Vartan Gregorian, we also decided to create a coalition of Authors Guild writers, PEN writers, and those of the Academy and Institute of Arts and Letters. Hortense Calisher, president of the latter organization, agreed to join the campaign and organize support.

Meeting with Paper Buyers

Last spring we met for a second time at AAP headquarters, this time with the buyers who actually buy the paper for our most influential publishers. They agreed that acid-free and acidic paper are cost-comparable. This is perhaps best summed up by Howard Goldstein, vice president and director of production for Simon & Schuster, who declared, "There's absolutely no difference in cost." Edward McGill, vice president for production at Random House, said, "Costs are virtually the same for acid and acid-free paper."

As a final follow-up to this meeting the Goldsmith-Perry Foundation commissioned a cost study. Costs were proved to be comparable. And as a result of the cost study, agents were solicited to begin negotiating contracts for acid-free paper for their authors. Georges Borchardt, Charles Rembar, and Morton Janklow were among the first to volunteer.

We approached both Richard Snyder, chairman and CEO of S&S, and Robert Bernstein, chairman and CEO of Random House, and asked if they would join in the crusade to have publishers switch to acid-free paper starting with their own houses, Simon & Schuster and Random House. Both agreed to serve on the committee for the New York Public Library advocacy office opening and to join in our efforts to honor those publishers who immediately switch to hardcover trade book first printings on acid-free paper.

For the March 7th Advocacy Office opening our committee will consist of the president of NYPL, Robert Bernstein, Richard Snyder, Barbara Goldsmith, Morton Janklow, and Tom Wolfe, chairman of the NYPL Conservators Committee. We hope that this event will have international importance. We plan to honor publishers, authors, preservationists, and other support people who have moved us so far along in the campaign to switch to acid-free paper.

It looks as though (without undue optimism) all first printings of hardcover trade books may in the near future be on acid-free paper.

To be published in THE AUTHORS GUILD BULLETIN, FALL 1988

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FAX (202) 462-7849

AAUP MEMBERS FIRMLY COMMITTED TO PERMANENT PAPER

A RECENT SURVEY of the full membership of the Association of American University Presses (AAUP) confirms their strong commitment to the use of permanent paper for most of their publications. The survey was conducted in May 1988 as a joint project of the AAUP Task Force on University Press-Library Relations and the Association of Research Libraries (ARL).

Ninety-six percent of the responding 85 publishers indicated they use permanent or alkaline paper in the manufacture of at least some of their publications. Nearly 60 percent of the presses use permanent paper in all books; 14 percent use permanent paper in all books except paperbacks, while 7 percent use permanent paper for first printings only.

ARL and AAUP decided to conduct the survey because there was a lack of hard data concerning the extent of permanent (or alkaline) paper use among university presses. While the results confirm high use of paper which meets or exceeds standards for permanency, it appears that many university presses do not announce that practice to their readers or potential customers. Only 50 percent of the presses indicate their use of permanent paper in their books; only one-quarter announce its use in their catalogs, and only 5 percent mention permanent paper use in their ads.

"University presses are leading the way in the use of permanent paper in book publishing. Their example should encourage other publishers to follow suit," commented Duane E. Webster, executive director of ARL.

John Moore, chair of the AAUP Task Force, expressed his pleasure in the survey's findings, and urged AAUP members to announce their use of permanent paper to their constituencies:

> *We can help heighten awareness of the increasing use of permanent paper and make a real contribution to the efforts of libraries and publishers to preserve scholarly works for generations to come.*

In addition to statistical findings on practices of university presses, the survey yielded a listing of responding presses with contact person's names and phone numbers, as well as a list of paper suppliers used by the presses. Copies of the 12-page report are available for $15.00 (prepayment required) from: SPEC, ARL/OMS, 1527 New Hampshire Avenue NW, Washington, DC 20036. *mks/11/08/88*

101ST CONGRESS
1ST SESSION

S. J. RES. 57

To establish a national policy on permanent papers.

IN THE SENATE OF THE UNITED STATES

FEBRUARY 8 (legislative day, JANUARY 3), 1989

Mr. PELL (for himself, Mr. MOYNIHAN, Mr. MURKOWSKI, Mr. SARBANES, Mr. GRASSLEY, Mr. MCCAIN, Mr. DECONCINI, Mr. FORD, Mr. KENNEDY, Mr. EXON, Mr. SANFORD, Mr. HEFLIN, Mr. LIEBERMAN, Mr. STEVENS, Mr. SIMON, Mr. DODD, Mr. WARNER Mr. CHAFEE, Mr. HATCH, and Mr. GRAHAM) introduced the following joint resolution; which was read twice and referred to the Committee on Governmental Affairs

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JOINT RESOLUTION

To establish a national policy on permanent papers.

Whereas it is now widely recognized and scientifically demonstrated that the acidic papers commonly used in documents, books, and other publications for more than a century are self-destructing and will continue to self destruct;

Whereas Americans are facing the prospect of continuing to lose national historical, scientific and scholarly records, including government records, faster than salvage efforts can be mounted despite the dedicated efforts of many libraries, archives, and agencies, such as the Library of Congress and the National Archives and Records Administration;

Whereas the Congress has already appropriated $50,000,000 to the National Archives and Records Administration,

$32,000,000 to the Library of Congress, and $2,400,000 to the National Library of Medicine for deacidifying or microfilming books too brittle for ordinary use, and $25,000,000 to the National Endowment for the Humanities for grants to libraries and archives for such purposes;

Whereas nationwide many hundreds of millions of dollars will have to be spent by the Federal, State, and local governments and private institutions to salvage the most essential books and other materials in the libraries and archives of academic and private institutions;

Whereas there is an urgent need to prevent the continuance of the acid paper problem into the indefinite future;

Whereas acid free permanent papers with a life of several hundred years already are being produced at prices competitive with acid papers;

Whereas the American Library Association Council in a resolution dated January 13, 1988, has urged publishers to use acid free permanent papers in books and other publications of enduring use and value, and other professional organizations have expressed similar opinions;

Whereas some publishers such as the National Historical Publications and Records Commission, the Library of Congress and many university presses are already publishing on acid free permanent papers, and the Office of Technology Assessment has estimated that only 15 to 25 percent of the books currently being published in the United States are printed on such paper;

Whereas even when books are printed on acid free permanent paper this fact is often not made known to libraries by notations in the book or by notations in standard bibliographic listings;

Whereas most Government agencies do not require the use of acid free permanent papers for appropriate Federal records and publications, and associations representing commercial publishers and book printers have thus far not recommended the use of such papers;

Whereas paper manufacturers have stated that a sufficient supply of acid free permanent papers would be produced if publishers would specify the use of such papers; and

Whereas there is currently no statistical information from public or private sources regarding the present volume of production of acid free permanent papers and the volume of production required to meet an increased demand: Now, therefore, be it

Resolved by the Senate and House of Representatives of the United States of America in Congress assembled,

SECTION 1. It is the policy of the United States that Federal records, books, and publications of enduring value be produced on acid free permanent papers.

SEC. 2. The Congress of the United States urgently recommends the following:

(1) Federal agencies require the use of acid free permanent papers for publications of enduring value produced by the Government Printing Office or produced by Federal grant or contract, using the specifications for such paper established by the Joint Committee on Printing.

(2) Federal agencies require the use of archival quality acid free papers for permanently valuable Fed-

eral records and confer with the National Archives and Records Administration on the requirements for paper quality.

(3) American publishers use acid free permanent papers for publications of enduring value, in voluntary compliance with the American National Standard, and note the use of such paper in books, in advertisements, in catalogs, and in standard bibliographic listings.

(4) Reliable statistics be produced by public or private institutions on the present production of acid free permanent papers and the volume of production required to meet the national policy declared in section 1.

(5) The Secretary of State make known the national policy regarding acid free permanent papers to foreign governments and appropriate international agencies since the acid paper problem is worldwide and essential foreign materials being imported by our libraries are printed on acid papers.

SEC. 3. The Librarian of Congress, the Archivist of the United States, the Director of the National Library of Medicine, and the Administrator of the National Library of Agriculture shall jointly monitor the Nation's progress in implementing the national policy declared in section 1 regarding

●SJ 57 IS

acid free permanent papers and report annually to the Congress regarding such progress by January 1, 1991, and each succeeding year thereafter.

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United States of America

Congressional Record

PROCEEDINGS AND DEBATES OF THE 100th CONGRESS, SECOND SESSION

Vol. 134 WASHINGTON, TUESDAY, OCTOBER 11, 1988 No. 141

Senate

By Mr. PELL:

S.J. Res. 394. Joint resolution to establish a national policy on permanent papers; to the Committee on Governmental Affairs.

NATIONAL POLICY ON PERMANENT PAPERS

Mr. PELL. Mr. President, I am introducing today a Senate joint resolution which would establish a national policy that books and other publications of enduring value be published on acid free paper.

Within the last year, an increasing amount of publicity has been given to the fact that we are facing the loss of an enormous part of our historical, cultural, and scientific record because of the self-destruction of the acidic papers on which books and other publications have been printed since the mid-19th century. This is the problem of the "brittle books," which has been the subject of attention on public television and other media.

I have been particularly concerned about this problem in my role as chairman of the Joint Committee on the Library in the 100th Congress. The Library of Congress is a pioneer in developing the technology for mass deacidification of its collections through the use of diethylzinc [DEZ]. A pilot plant utilizing this process is now being tested in Houston, with the expectation that a large scale facility will soon be in operation under license from the Library. The present goal is to begin treatment of all the Library's new acquisition by 1991 and to start retrospective treatment at the same time of existing publications in American history.

The National Archives and Records Administration and the National Library of Medicine are also making vigorous efforts to deal with the problem, either through deacidification or through microfilming books and publications which are already too brittle to save.

Congress has already appropriated over $100 million in support of these efforts, and we should be prepared to provide more. At stake is nothing less than the preservation of the whole record and literacy output of the most remarkable century of human experience to date.

However, it makes little sense to continue the remedy without attempting to curb the basic problem. And that is what the resolution I am offering today is designed to do. It establishes a national policy to promote and encourage the printing of books and other publications of enduring value on nonacidic paper. In a figurative sense, it locks the library door against prospective invasion by publications printed on acidic paper.

The resolution would declare it to be a policy of the United States that all Federal records, books and publications of enduring value be produced on acid-free papers. In furtherance of that objective, the resolution urgently recommends that Federal agencies require the use of archival quality papers for permanently valuable Federal records, and the use of permanent papers for other publications of endur-

ing value.

The resolution would also urgently recommend that American publishers voluntarily adhere to the American National Standard for permanent paper in printing publications of enduring value, and that the use of such paper be noted in the publication, in advertisements and in standard bibliographic listings.

Finally, the resolution would urge the compilation of reliable statistics on the production of permanent paper and on the volume required to meet the objectives of the national policy established by the bill. And it would direct the Librarian of Congress and the Archivist of the United States, together with the directors of the national libraries of medicine and agriculture, to monitor progress in implementing the national policy and report annually to Congress.

It is worth noting, Mr. President, that some progress is already being made toward implementing the national policy. The recent excellent study of Book Preservation Technologies prepared by the Office of Technology Assessment estimated that 15 to 25 percent of the books currently being published in the United States are printed on acid-free paper.

The Library of Congress and many university presses are among those already published on acid free papers, as is the National Historical Publications and Records Commission. As a former member of the Commission, I am proud to have had a role in establishing its policy of publishing on permanent paper.

Clearly, the technology exists to implement the national policy. I am advised that permanent papers with a life of several hundred years can be produced at prices generally competitive with acid papers. The implementation of a national policy with respect to Federal records and publications surely would stimulate an expansion of production of nonacidic papers and hopefully lead to increasingly competitive prices.

Finally, it should be noted that the implementation of the national policy, by attacking the problem prospectively, will have the effect of reducing the long-range costs of deacidification. Every book produced on acid-free paper today frees up preservation resources which can be used to attack the crumbling backlog of publications dating back to 1850.

I commend this resolution to the attention of the Senate, and I invite comments and suggestions. It is, of course, late in the 100th Congress, but I intend the reintroduce the resolution in January 1989, and I hope it will be possible to hold public hearings soon thereafter to explore the matter in-depth. I have every confidence that it will not be said 100 years from now that we knew how to solve this problem but did nothing about it.

United States of America

Congressional Record

PROCEEDINGS AND DEBATES OF THE 101st CONGRESS, FIRST SESSION

Vol. 135 WASHINGTON, WEDNESDAY, FEBRUARY 8, 1989 No. 13

Senate

S.J. Res. 57. Joint resolution to establish a national policy on permanent papers; to the Committee on Governmental Affairs.

NATIONAL POLICY ON PERMANENT PAPERS

Mr. PELL. Mr. President, I am introducing today a Senate joint resolution to establish a national policy to encourage the publication on acid free permanent paper of books, records, and publications of enduring value. Joining me as original cosponsors of the resolution are Senators MOYNIHAN, MURKOWSKI, SARBANES, GRASSLEY, MCCAIN, DECONCINI, FORD, KENNEDY, EXON, SANFORD, HEFLIN, LIEBERMAN, STEVENS, SIMON, DODD, WARNER, CHAFEE, HATCH, AND GRAHAM.

The joint resolution, which is virtually identical to Senate Joint Resolution 394 which I introduced in the 100th Congress, reflects a growing concern about the impending loss of an enormous part of our historical, cultural, and scientific records and literature because of the self-destruction of the acidic papers on which books and other publications have been printed since the mid-19th century.

As chairman of the Joint Committee on the Library in the 100th Congress, I had the opportunity to review both the magnitude of this problem as well as the great efforts already being made, at considerable public expense, to limit the self-destruction. The Library of Congress, for example, is pioneering in the development of technology for the mass deacidification of its collections through the use of diethylzinc [DEZ]. The present goal is to begin treatment of all the Library's new acquisitions by 1991 and to start retrospective treatment at the same time of existing publications in American history.

The National Archives and Records Administration and the National Library of Medicine are also making vigorous efforts to deal with the problem, either through deacidification or through microfilming books and publications which are already too brittle to save.

Congress has already appropriated over $100 million in support of these efforts, and we should be prepared to provide more. At stake is nothing less than the preservation of the whole record and literary output of the most remarkable century of human experience to date.

However, it makes little sense to continue the remedy without attempting to curb the basic problem. And that is what the joint resolution I am offering today is designed to do. It establishes a national policy to promote and encourage the printing of books and other publications of enduring value on nonacidic paper. In a figurative sense, it locks the library door against prospective invasion by publications printed on acidic paper.

The joint resolution declares it to be a policy of the United States that all Federal records, books, and publications of enduring value be produced on acid free permanent paper. In furtherance of that objective, the joint resolution urgently recommends that Federal agencies require the use of such paper for publications of enduring value, and the use of archival quality papers for permanently valuable Federal records.

The joint resolution urges similar action in the private sector. It urgently recommends that American publishers voluntarily adhere to the American National Standard for permanent paper in printing publications of enduring value, and that the use of such paper be noted in the publication, in advertisements and in standard bibliographic listings.

Finally, the joint resolution would urge the compilation of reliable statistics on the production of acid free permanent paper and on the volume required to meet the objectives of the national policy established by the bill. And it would direct the Librarian of Congress and the Archivist of the United States, together with the directors of the national libraries of medicine and agriculture, to monitor progress in implementing the national policy and report annually to Congress.

It is worth noting, Mr. President, that some progress is already being made toward implementing the na-

tional policy. The recent excellent study of Book Preservation Technologies prepared by the Office of Technology Assessment estimated that 15 to 25 percent of the books currently being published in the United States are printed on acid free paper.

The Library of Congress and many university presses are among those already publishing on acid free papers, as is the National Historical Publications and Records Commission. As a former member of the commission, I am proud to have had a role in establishing its policy of publishing on permanent paper.

Fortunately, the technology exists to implement the national policy. More than 30 U.S. papermills are already producing nonacidic, alkaline papers, and there are major economic incentives for other mills now making only acid papers to convert, including potentially lowered manufacturing costs and substantially reduced environmental pollution.

Moreover, prices for acid-free, alkaline paper are comparable to those for acidic paper, according to a 1988 survey. The enactment of the national policy proposed in this resolution surely would stimulate an expansion of production of nonacidic papers and hopefully lead to increasingly competitive prices.

I particularly wish to emphasize that this resolution mandates no Government program, and should impose no significant costs on the Federal Government, assuming the accuracy of the economic estimates. If anything, the joint resolution could result in a net reduction in costs to the Government because it will have the effect of reducing the long-range costs of deacidification. Every book produced on acid free paper today reduces the total number of volumes requiring deacidification, and frees up preservation resources which can be used to attack the crumbling backlog of publications dating back to 1850.

Finally, I might just note that the basic problem which this resolution addresses is not limited to print media alone. Other kinds of historical records are deteriorating from a variety of causes that may require different public responses. I am advised in particular that thousands of feet of historical and archival films owned by the U.S. Government are in jeopardy and may properly be the subject of separate efforts comparable to that which we propose today with respect to acid paper.

I commend this joint resolution to the attention of the Senate, and I hope that it will receive the consideration which I believe it deserves in committee. We have the means at hand to prevent an indefinite proliferation of the acid paper problem and I only hope that it will not be said 100 years from now that we knew how to solve the problem but did nothing about it.

Mr. President, I ask that resolutions of the American Library Association and the Special Libraries Association in support of the resolution be printed in the RECORD, together with letters of support from the Association of Research Libraries, the Medical Library Association, and the libraries of the University of Michigan, Yale University, and D'Youville College of Buffalo, NY.

There being no objection, the material was ordered to be printed in the RECORD, as follows:

COUNCIL OF THE AMERICAN LIBRARY ASSOCIATION RESOLUTION ON NATIONAL POLICY ON PERMANENT PAPERS

Whereas, a joint resolution to establish a national policy on permanent papers, S.J. Res. 394, was introduced in the Senate in October 1988 by Senator Claiborne Pell (D-RI), Chairman of the Joint Committee on the Library and Chairman of the Senate Foreign Relations Committee; and

Whereas, Senator Pell has announced his intention to reintroduce the resolution early in 1989, and similar legislation may be introduced in the House; and

Whereas, the American Library Association urged publishers and federal, state and local governments to use permanent paper for books and other publications of enduring value in a resolution passed by the ALA Council on January 13, 1988, (1987-88 CD # 34); and

Whereas, the ALA resolution noted that about one-fourth of the books in research library collections have become so embrittled that pages will break or crumble with use, and that hundreds of millions of dollars will be spent to salvage brittle materials if they continue to be printed on the acidic paper in general use since about 1850; and

Whereas, extensive research conducted over the past several decades has demonstrated that alkaline papers have a significantly longer shelf life than acidic papers; and

Whereas, production of alkaline paper in the U.S. has increased steadily within the last two years, is expected to double over the next two years, and is priced competitively; and

Whereas, S.J. Res. 394 would resolve that it is the policy of the U.S. that federal publications of enduring value be produced on acid-free, permanent papers and would specifically: (1) recommend that federal agencies require use of permanent paper for publications of enduring value; (2) recommend that federal agencies require use of archival quality papers for permanently valuable federal records; (3) recommend that American publishers use permanent papers for publications of enduring value, voluntarily comply with national standards, and note use of acid-free papers in publications and listings; (4) recommend that reliable statistics be produced on current and needed pro-

duction of permament papers; (5) recommend that the State Department make known this national policy to foreign governments and international agencies; and (6) require that the Library of Congress, the National Archives and Records Administration, the National Library of Medicine, and the National Agricultural Library jointly monitor progress and report annually to Congress: now, therefore, be it

Resolved, That the American Library Association strongly support S.J. Res. 394, to establish a national policy on permanent papers, and its successor measures; and, be it further

Resolved, That the American Library Association express its appreciation to Senator Claiborne Pell, and offer support and assistance to Senator Pell and the chief sponsors of similar measures in the 101st Congress in establishing as national policy that federal records, books, and other publications of enduring value be produced on alkaline papers.

SPECIAL LIBRARIES ASSOCIATION BOARD OF DIRECTORS RESOLUTION SUPPORTING THE ESTABLISHMENT OF A NATIONAL POLICY ON THE USE OF PERMANENT PAPERS

Whereas, there has been much loss of cultural, scientific and historical records due to the continued use of acidic paper; and

Whereas, Government publications, containing an enormous amount of valuable information and statistical data, are still being produced on self-destructive acidic paper; and

Whereas, Senator Claiborne Pell, of Rhode Island, introduced a joint resolution in the 100th Congress which called for the establishment of a national policy on permanent papers; and

Whereas, This joint resolution demonstrates that members of Congress have begun to recognize that by not utilizing currently available technologies our nation's books and other publications of enduring value could turn to dust; and

Whereas, The Special Libraries Association is an international professional association of more than 12,500 special librarians and information specialists; now, therefore, be it

Resolved, That the Special Libraries Association commend Senator Pell and his staff for taking the lead in calling for such a national policy and urge him to reintroduce the joint resolution as expeditiously as possible in the 101st Congress, and, be it

Further resolved, That Congress approve the Joint Resolution and appropriate adequate funding so that plans for the implementation of such a national policy can take shape as our nation heads into the 1990's.

ASSOCIATION OF RESEARCH LIBRARIES,
Washington, DC, December 20, 1988.

Hon. CLAIBORNE PELL,
Russell Senate Office Building, U.S. Senate, Washington, DC.

DEAR SENATOR PELL: This letter is to register the enthusiastic support of the Association of Research Libraries for your initiative to establish a national policy on permanent papers for the United States by introducing S.J. Res. 394 on October 11, 1988.

As you know, significant portions of distinctive research collections, representing the world's intellectual heritage, are at risk because the acidic paper they are printed on is deteriorating. There are a number of strategies to address this problem. ARL concludes, however, that the single most effective solution to this problem is to discontinue use of acidic paper for book production and use instead alkaline, durable paper. This eliminates the problem at its source. Publications produced on acid free paper will last for centuries rather than decades. Use of alkaline paper in publishing will have a more direct impact on preserving knowledge than any other single effort.

Possibly the greatest barriers to the use of alkaline paper for publishing are lack of awareness about the problem of acidic paper and/or misperceptions about the availability and price of alkaline paper. The resolution you propose provides a visible platform for capturing the attention of publishers to this need and setting the record straight about the supply of alkaline paper.

ARL thanks you for your leadership in this area and looks forward to positive action on this legislation in the 101st Congress.

Sincerely,

DUANE E. WEBSTER,
Executive Director.

MEDICAL LIBRARY ASSOCIATION,
CHICAGO, IL
January 10, 1989.

Senator CLAIBORNE PELL,
Russell Senate Office Building,
Washington, DC.

DEAR SENATOR PELL: I am writing on behalf of the Medical Library Association to register support for your initiative to establish a national policy on permanent papers for the United States by introducing S.J. Res. 394 on October 11, 1988. The Medical Library Association is a professional organization of 5000 individuals and institutions in the health sciences information field. MLA members serve society by developing new health information delivery systems, fostering educational and research programs for health sciences information professionals, and encouraging an enhanced public awareness of health care issues.

As you know, significant portions of distinctive collections, representing the world's intellectual heritage, are at risk because the acidic paper they are printed on is deteriorating. There are a number of strategies to address this problem. However, the single most effective solution to this problem is to discontinue use of acidic paper for book production and use instead alkaline, durable paper. This eliminates the problem at its source. Publications produced on acid free paper will last for centuries rather than decades. Use of alkaline paper in publishing will have a more direct impact on preserving knowledge than any other single effort.

Possibly the greatest barriers to the use of alkaline paper for publishing are lack of awareness about the problem of acidic paper and/or misperceptions about the availability and price of alkaline paper. The resolution you propose provides a visible platform for capturing the attention of publishers to this need and setting the record straight about the supply of alkaline paper.

On behalf of the Medical Library Association, I would like to thank you for your leaderhsip in this area, and I look forwad to

positive action on this resolution in the 101st Congress.

Sincerely,

RAYMOND A. PALMER,
Executive Director.

UNIVERSITY LIBRARY,
THE UNIVERSITY OF MICHIGAN,
Ann Arbor, MI, January 19, 1989.

Hon. CLAIBORNE PELL,
U.S. Senate,
Washington, DC.

DEAR SENATOR PELL: I recently read of your efforts to introduce legislation in support of a national policy on permanent papers, as described in S.J. Res. 394.

As a librarian responsible for coordinating a major preservation effort to save the contents of publications which have been printed during the past one-hundred years on acid-pulp paper, I write to encourage you to actively pursue this legislative effort to put in place an acid-free paper policy. This is something that cannot occur too rapidly.

Selected publishers have proven that it is very doable and that one of the major drawbacks appears to be the rate at which the paper manufacturers can convert their operations to producing acid-free papers. Legislation would encourage that development and bring us closer to the day when all significant publications are produced on acid-free paper, ensuring their availability for future generations of scholars and everyday readers.

I know from my origins in Rhode Island and following your efforts on behalf of libraries and books since then of your success on many fronts in support of similar efforts. I encourage you to proceed in the next legislative session with this initiative so that in the near future our publications will be printed on acid-free paper, removing the need for a major preservation effort in the Twenty-first Century and ensuring that publications will be available for generations to come.

Most Sincerely,

WILLIAM A. GOSLING,
Assistant Director for
Technical Services.

YALE UNIVERSITY,
New Haven, CT, January 23, 1989.

Hon. CLAIBORNE PELL,
335 Senate Russell Office Building, Washington, DC.

DEAR SENATOR PELL: On behalf of Yale Library, I would like to express our appreciation of your efforts to establish a national policy on the use of permanent papers. The deterioration of the written record of our society has long been a concern of librarians and scholars and other informed citizens. We are very pleased that as a result of your interest, this critical issue is receiving increased attention in the federal government. We hope that your Senate colleagues will share your concern and co-sponsor your resolution on permanent papers.

Sincerely yours,

MILLICENT D. ABELL.

D'YOUVILLE COLLEGE,
Buffalo, NY, January 30, 1989.

Senator CLAIBORNE PELL,
Senate Russell Office Building, Washington, DC.

DEAR SENATOR PELL: Thank you for sponsoring the Senate Joint Resolution 304 to establish a national policy that books of enduring value be published on acid-free paper. Hopefully, the concept of "enduring value" will be defined clearly so that publishers do not try to work around this legislation. Many of the materials published in the 60's and 70's especially items on women and African-Americans are now in very poor physical condition. The likelihood of these materials being re-issued is very slim. Even if they were re-issued, library budgets are not large enough to cover repurchasing those materials. Keep up the good work!

Sincerely,

MICHELE FARRELL,
Library Director.

Mr. KENNEDY. Mr. President, I am pleased to be a sponsor of this joint resolution to establish a national policy on permanent paper.

As we have increasingly come to understand, one of the most precious national resources we have is increasingly at great risk. Without dramatic and immediate preventive measures, countless volumes of inestimable historical and cultural value will be lost as their pages disintegrate. Across the country, nearly 80 million volumes have already become so brittle that they will crumble if used. At Harvard University alone, almost half of its collection of 11.5 million volumes will be in danger by the year 2020.

While we work to salvage the volumes already in danger, we should do all we can to avoid the problem in the future by using acid-free permanent paper in as many publications as possible.

I commend Senator PELL for his leadership on this issue. Increased national awareness of the problem is an essential part of the solution. Our documentary and literary heritage is at stake. Immediate action is warranted. I hope that the Senate will move quickly to pass this joint resolution.

United States of America

Congressional Record

PROCEEDINGS AND DEBATES OF THE 101st CONGRESS, FIRST SESSION

Extensions of Remarks *March 23, 1989* E 1005–1006

RESOLUTION ON PERMANENT PAPER

HON. PAT WILLIAMS

OF MONTANA

IN THE HOUSE OF REPRESENTATIVES

Thursday, March 23, 1989

Mr. WILLIAMS. Mr. Speaker, I rise today to introduce a resolution to establish a national policy on the use of permanent papers for publications and records of enduring value. Joining me as original cosponsors are Mr. ANNUNZIO, Mr. YATES, Mr. WALGREN, Mr. OWENS, and Mrs. BOGGS.

It is now widely recognized that we face a crisis in preserving our historic, cultural, and scientific record, not only in this country but world wide. The acidic papers on which most publications and records have been printed for more than 100 years have been and are self-destructng. It will cost hundreds of millions of dollars from Federal, State, and local governments and private institutions to salvage what can still be saved of deteriorating books and other materials through the process of deacidification or by microfilming. The Congress has already appropriated more than $100 million for a salvage operation in the Library of Congress, other Federal libraries and archives, and research libraries. Much more will be required.

Fortunately, we do not have to face this problem into the indefinite future. The root cause has been determined—acid paper—and it is now possible to produce nonacid papers which will last several hundred years. More than 30 paper mills in this country are already doing so at costs comparable to those for acidic papers. Most university presses and many private publishers are using nonacid papers, but the majority of books and scientific and professional journals are still printed on acid papers. Even those publishers who use nonacid papers are not generally indicating that fact in the publications themselves. Thus librarians and archivists often do not know what they are receiving.

The purpose of this resolution, therefore, is to draw attention to the problem. The resolution would establish a national policy that all books, other publications, and Federal documents of enduring value be printed on permanent papers, that is, nonacidic or alkaline papers. In addition, the resolution would urgently recommend that Federal agencies require use of permanent paper for publications of enduring value; that Federal agencies require use of archival quality papers for permanently papers for publications of enduring value, voluntarily comply with national standards, and indicate this fact in the publications themselves and in bibliographic listings; that reliable statistics be produced on current and needed production of permanent papers; and that the State Department make known this national policy to foreign governments and international agencies. The problem is world wide, and our libraries and research institutions must acquire much scientific, historical, and cultural literature from abroad.

In order to monitor progress, the resolution directs the Librarian of Congress and the heads of the National Library of Medicine, the National Agricultural Library, and the Archivist of the United States to report annually to the Congress on the effect of the resolution.

The measure has no net cost to the Federal Government. In fact, over the years it will eliminate great future costs not only to the Federal Government, but to State and local governments and public and private institutions such as universities, archives, and libraries. Compliance by private publishers is voluntary, but we are confident that it will become virtually universal by appealing to the public spirit of all concerned.

The principle of the resolution has the support of many organizations, including the American Library Association, the Association of Research Libraries, the Medical Libraries Association, the National Humanities Alliance, and the Special Libraries Association.

I invite my colleagues, many of whom have expressed their concern about this national problem, to join in cosponsorship; and I urge the committee to which the resolution may be referred to take it up for consideration as early as possible in this session of Congress.

SENATE

February 8, 1989

S 1385–1387

By Mr. PELL (for himself, Mr. MOYNIHAN, Mr. MURKOWSKI, Mr. SARBANES, Mr. GRASSLEY, Mr. MCCAIN, Mr. DECONCINI, Mr. FORD, Mr. KENNEDY, Mr. EXON, Mr. SANFORD, Mr. HEFLIN, Mr. LIEBERMAN, Mr. STEVENS, Mr. SIMON, Mr. DODD, Mr. WARNER, Mr. CHAFEE, Mr. HATCH, and Mr. GRAHAM):

S.J. Res. 57. Joint resolution to establish a national policy on permanent papers; to the Committee on Governmental Affairs.

NATIONAL POLICY ON PERMANENT PAPERS

Mr. PELL. Mr. President, I am introducing today a Senate joint resolution to establish a national policy to encourage the publication on acid free permanent paper of books, records, and publications of enduring value. Joining me as original cosponsors of the resolution are Senators MOYNIHAN, MURKOWSKI, SARBANES, GRASSLEY, MCCAIN, DECONCINI, FORD, KENNEDY, EXON, SANFORD, HEFLIN, LIEBERMAN, STEVENS, SIMON, DODD, WARNER, CHAFEE, HATCH, AND GRAHAM.

The joint resolution, which is virtually identical to Senate Joint Resolution 394 which I introduced in the 100th Congress, reflects a growing concern about the impending loss of an enormous part of our historical, cultural, and scientific records and literature because of the self destruction of the acidic papers on which books and other publications have been printed since the mid-19th century.

As chairman of the Joint Committee on the Library in the 100th Congress, I had the opportunity to review both the magnitude of this problem as well as the great efforts already being made, at considerable public expense, to limit the self-destruction. The Library of Congress, for example, is pioneering in the development of technology for the mass deacidification of its collections through the use of diethylzinc [DEZ]. The present goal is to begin treatment of all the Library's new acquisitions by 1991 and to start retrospective treatment at the same time of existing publications in American history.

The National Archives and Records Administration and the National Library of Medicine are also making vigorous efforts to deal with the problem, either through deacidification or through microfilming books and publications which are already too brittle to save.

Congress has already appropriated over $100 million in support of these efforts, and we should be prepared to provide more. At stake is nothing less than the preservation of the whole record and literary output of the most remarkable century of human experience to date.

However, it makes little sense to continue the remedy without attempting to curb the basic problem. And that is what the joint resolution I am offering today is designed to do. It establishes a national policy to promote and encourage the printing of books and other publications of enduring value on nonacidic paper. In a figurative sense, it locks the library door against prospective invasion by publications printed on acidic paper.

The joint resolution declares it to be a policy of the United States that all Federal records, books, and publications of enduring value be produced on acid free permanent paper. In furtherance of that objective, the joint resolution urgently recommends that Federal agencies require the use of such paper for publications of enduring value, and the use of archival quality papers for permanently valuable Federal records.

The joint resolution urges similar action in the private sector. It urgent-

ly recommends that American publishers voluntarily adhere to the American National Standard for permanent paper in printing publications of enduring value, and that the use of such paper be noted in the publication, in advertisements and in standard bibliographic listings.

Finally, the joint resolution would urge the compilation of reliable statistics on the production of acid free permanent paper and on the volume required to meet the objectives of the national policy established by the bill. And it would direct the Librarian of Congress and the Archivist of the United States, together with the directors of the national libraries of medicine and agriculture, to monitor progress in implementing the national policy and report annually to Congress.

It is worth noting, Mr. President, that some progress is already being made toward implementing the national policy. The recent excellent study of Book Preservation Technologies prepared by the Office of Technology Assessment estimated that 15 to 25 percent of the books currently being published in the United States are printed on acid free paper.

The Library of Congress and many university presses are among those already publishing on acid free papers, as is the National Historical Publications and Records Commission. As a former member of the commission, I am proud to have had a role in establishing its policy of publishing on permanent paper.

Fortunately, the technology exists to implement the national policy. More than 30 U.S. papermills are already producing nonacidic, alkaline papers, and there are major economic incentives for other mills now making only acid papers to convert, including potentially lowered manufacturing costs and substantially reduced environmental pollution.

Moreover, prices for acid-free, alkaline paper are comparable to those for acidic paper, according to a 1988 survey. The enactment of the national policy proposed in this resolution surely would stimulate an expansion of production of nonacidic papers and hopefully lead to increasingly competitive prices.

I particularly wish to emphasize that this resolution mandates no Government program, and should impose no significant costs on the Federal Government, assuming the accuracy of the economic estimates. If anything, the joint resolution could result in a net reduction in costs to the Government because it will have the effect of reducing the long-range costs of deacidification. Every book produced on acid free paper today reduces the total number of volumes requiring deacidification, and frees up preservation resources which can be used to attack the crumbling backlog of publications dating back to 1850.

Finally, I might just note that the basic problem which this resolution addresses is not limited to print media alone. Other kinds of historical records are deteriorating from a variety of causes that may require different public responses. I am advised in particular that thousands of feet of historical and archival films owned by the U.S. Government are in jeopardy and may properly be the subject of separate efforts comparable to that which we propose today with respect to acid paper.

I commend this joint resolution to the attention of the Senate, and I hope that it will receive the consideration which I believe it deserves in committee. We have the means at hand to prevent an indefinite proliferation of the acid paper problem and I only hope that it will not be said 100 years from now that we knew how to solve the problem but did nothing about it.

Mr. President, I ask that resolutions of the American Library Association and the Special Libraries Association in support of the resolution be printed in the RECORD, together with letters of support from the Association of Research Libraries, the Medical Library Association, and the libraries of the University of Michigan, Yale University, and D'Youville College of Buffalo, NY.

There being no objection, the material was ordered to be printed in the RECORD, as follows:

COUNCIL OF THE AMERICAN LIBRARY ASSOCIATION RESOLUTION ON NATIONAL POLICY ON PERMANENT PAPERS

Whereas, a joint resolution to establish a national policy on permanent papers, S.J. Res. 394, was introduced in the Senate in October 1988 by Senator Claiborne Pell (D-RI), Chairman of the Joint Committee on the Library and Chairman of the Senate Foreign Relations Committee; and

Whereas, Senator Pell has announced his intention to reintroduce the resolution early in 1989, and similar legislation may be introduced in the House; and

Whereas the American Library Association urged publishers and federal, state and local governments to use permanent paper for books and other publications of enduring value in a resolution passed by the ALA Council on January 13, 1988 (198: 88 CD #34; and

Whereas, the ALA resolution noted that about one-fourth of the books in research library collections have become so embrittled that pages will break or crumble with use, and that hundreds of millions of dollars will be spent to salvage brittle materials if they continue to be printed on the acidic paper in most use since about 1850; and

Whereas, extensive research conducted over the past several decades has demonstrated that alkaline papers have a significantly longer shelf life than acidic papers; and

Whereas, production of alkaline paper in the U.S. has increased steadily within the last two years, is expected to double over the next two years, and is priced competitively; and

Whereas, S.J. Res. 394 would resolve that it is the policy of the U.S. that federal publications of enduring value be produced on acid-free, permanent papers and would specifically: (1) recommend that federal agencies require use of permanent paper for publications of enduring value; (2) recommend that federal agencies require use of archival quality papers for permanently valuable federal records; (3) recommend that American publishers use permanemt papers for publications of enduring value, voluntarily comply with national standards, and note use of acid-free papers in publications and listings; (4) recommend that reliable statistics be produced on current and needed production of permanent papers; (5) recommend that the State Department make known this national policy to foreign governments and international agencies; and (6) require that the Library of Congress, the National Archives and Records Administration, the National Library of Medicine, and the National Agricultural Library jointly monitor progress and report annually to Congress; now, therefore, be it

Resolved, That the American Library Association strongly support S.J. Res. 394, to establish a national policy on permanent papers, and its successor measures; and, be it further

Resolved, That the American Library Association express its appreciation to Senator Claiborne Pell, and offer support and assistance to Senator Pell and the chief sponsors of similar measures in the 101st Congress in establishing as national policy that federal records, books, and other publications of enduring value be produced on alkaline papers.

SPECIAL LIBRARIES ASSOCIATION BOARD OF DIRECTORS RESOLUTION SUPPORTING THE ESTABLISHMENT OF A NATIONAL POLICY ON THE USE OF PERMANENT PAPERS

Whereas, there has been much loss of cultural, scientific and historical records due to the continued use of acidic paper; and

Whereas, Government publications, containing an enormous amount of valuable information and statistical data, are still being produced on self-destructive acidic paper; and

Whereas, Senator Claiborne Pell, of Rhode Island, introduced a joint resolution in the 100th Congress which called for the establishment of a national policy on permanent papers; and

Whereas, This joint resolution demonstrates that members of Congress have begun to recognize that by not utilizing currently available technologies our nation's books and other publications of enduring value could turn to dust; and

Whereas, The Special Libraries Association is an international professional association of more than 12,500 special librarians and information specialists; now, therefore be it

Resolved, That the Special Libraries Association commend Senator Pell and his staff for taking the lead in calling for such a national policy and urge him to reintroduce the joint resolution as expeditiously as possible in the 101st Congress, and, be it

Further resolved, That Congress approve the Joint Resolution and appropriate adequate funding so that plans for the implementation of such a national policy can take shape as our nation heads into the 1990's.

ASSOCIATION OF RESEARCH LIBRARIES,
Washington, DC, December 20, 1988.

Hon. CLAIBORNE PELL
Russell Senate Office Building, U.S. Senate, Washington, DC.

DEAR SENATOR PELL: This letter is to register the enthusiastic support of the Association of Research Libraries for your initiative to establish a national policy on permanent

papers for the United States by introducing S.J. Res. 394 on October 11, 1988.

As you know, significant portions of distinctive research collections, representing the world's intellectual heritage, are at risk because the acidic paper they are printed on is deteriorating. There are a number of strategies to address this problem. ARL concludes, however, that the single most effective solution to this problem is to discontinue use of acidic paper for book production and use instead alkaline, durable paper. This eliminates the problem at its source. Publications produced on acid-free paper will last for centuries rather than decades. Use of alkaline paper in publishing will have a more direct impact on preserving knowledge than any other single effort.

Possibly the greatest barriers to the use of alkaline paper for publishing are lack of awareness about the problem of acidic paper and/or misperceptions about the availability and price of alkaline paper. The resolution you propose provides a visible platform for capturing the attention of publishers to this need and setting the record straight about the supply of alkaline paper.

ARL thanks you for your leadership in this area and looks forward to positive action on this legislation in the 101st Congress.

Sincerely,

DUANE E. WEBSTER,
Executive Director.

MEDICAL LIBRARY ASSOCIATION,
CHICAGO IL,
January 10, 1989.

Senator CLAIBORNE PELL,
Russell Senate Office Building,
Washington, DC.

DEAR SENATOR PELL: I am writing on behalf of the Medical Library Association to register support for your initiative to establish a national policy on permanent papers for the United States by introducing S.J. Res. 394 on October 11, 1988. The Medical Library Association is a professional organization of 5000 individuals and institutions in the health sciences information field. MLA members serve society by developing new health information delivery systems, fostering educational and research programs for health sciences information professionals, and encouraging an enhanced public awareness of health care issues.

As you know, significant portions of distinctive collections, representing the world's intellectual heritage, are at risk because the acidic paper they are printed on is deteriorating. There are a number of strategies to address this problem. However, the single most effective solution to this problem is to discontinue use of acidic paper for book production and use instead alkaline, durable paper. This eliminates the problem at its source. Publications produced on acid free paper will last for centuries rather than decades. Use of alkaline paper in publishing will have a more direct impact on preserving knowledge than any other single effort.

Possibly the greatest barriers to the use of alkaline paper for publishing are lack of awareness about the problem of acidic paper and/or misperceptions about the availability and price of alkaline paper. The resolution you propose provides a visible platform for capturing the attention of publishers to this need and setting the record straight about the supply of alkaline paper.

On behalf of the Medical Library Association, I would like to thank you for your leadership in this area, and I look forward to positive action on this resolution in the 101st Congress.

Sincerely,

RAYMOND A. PALMER,
Executive Director.

UNIVERSITY LIBRARY,
THE UNIVERSITY OF MICHIGAN,
Ann Arbor, MI, January 19, 1989.

Hon. CLAIBORNE PELL,
U.S. Senate,
Washington, DC.

DEAR SENATOR PELL: I recently read of your efforts to introduce legislation in support of a national policy on permanent papers, as described in S.J. Res. 394.

As a librarian responsible for coordinating a major preservation effort to save the contents of publications which have been printed during the past one-hundred years on acid-pulp paper, I write to encourage you to actively pursue this legislative effort to put in place an acid-free paper policy. This is something that cannot occur too rapidly.

Selected publishers have proven that it is very doable and that one of the major drawbacks appears to be the rate at which the paper manufacturers can convert their operations to producing acid-free papers. Legislation would encourage that development and bring us closer to the day when all significant publications are produced on acid-free paper, ensuring their availability for future generations of scholars and everyday readers.

I know from my origins in Rhode Island and following your efforts on behalf of libraries and books since then of your success on many fronts in support of similar efforts. I encourage you to proceed in the next legislative session with this initiative so that in the near future our publications will be printed on acid-free paper, removing the need for a major preservation effort in the Twenty-first Century and ensuring that publications will be available for generations to come.

Most Sincerely,

WILLIAM A. GOSLING,
Assistant Director for
Technical Services.

YALE UNIVERSITY,
New Haven, CT, January 23, 1989.

Hon. CLAIBORNE PELL,
335 Senate Russell Office Building, Washington, DC.

DEAR SENATOR PELL: On behalf of Yale Library, I would like to express our appreciation of your efforts to establish a national policy on the use of permanent papers. The deterioration of the written record of our society has long been a concern of librarians and scholars and other informed citizens. We are very pleased that as a result of your interest, this critical issue is receiving increased attention in the federal government. We hope that your Senate colleagues will share your concern and co-sponsor your resolution on permanent papers.

Sincerely yours,

MILLICENT D. ABELL.

D'YOUVILLE COLLEGE,
Buffalo, NY, January 30, 1989.

Senator CLAIBORNE PELL,
Senate Russell Office Building, Washington, DC.

DEAR SENATOR PELL: Thank you for sponsoring the Senate Joint Resolution 394 to establish a national policy that books of enduring value be published on acid-free paper. Hopefully, the concept of "enduring value" will be defined clearly so that publishers do not try to work around this legislation. Many of the materials published in the 60's and 70's especially items on women and African-Americans are now in very poor physical condition. The likelihood of these materials being re-issued is very slim. Even if they were re-issued, library budgets are not large enough to cover repurchasing these materials. Keep up the good work!

Sincerely,

MICHELE FARRELL,
Library Director.

Mr. KENNEDY. Mr. President, I am pleased to be a sponsor of this joint resolution to establish a national policy on permanent paper.

As we have increasingly come to understand, one of the most precious national resources we have is increasingly at great risk. Without dramatic and immediate preventive measures, countless volumes of inestimable historical and cultural value will be lost as their pages disintegrate. Across the country, nearly 80 million volumes have already become so brittle that they will crumble if used. At Harvard University alone, almost half of its collection of 11.5 million volumes will be in danger by the year 2020.

While we work to salvage the volumes already in danger, we should do all we can to avoid the problem in the future by using acid-free permanent paper in as many publications as possible.

I commend Senator PELL for his leadership on this issue. Increased national awareness of the problem is an essential part of the solution. Our documentary and literary heritage is at stake. Immediate action is warranted. I hope that the Senate will move quickly to pass this joint resolution.

Identical measures to establish a national policy to promote and encourage the printing of books and other publications of enduring value on alkaline, permanent papers were introduced on February 8 as S. J. Res. 57 by Sen. Claiborne Pell (D-RI) and on March 23 as H. J. Res. 226 by Rep. Pat Williams (D-MT). See the reverse for the text of the measures.

S. J. RES. 57 & H. J. RES. 226

JOINT RESOLUTION

To establish a national policy on permanent papers.

Whereas it is now widely recognized and scientifically demonstrated that the acidic papers commonly used in documents, books, and other publications for more than a century are self-destructing and will continue to self destruct;

Whereas Americans are facing the prospect of continuing to lose national historical, scientific and scholarly records, including government records, faster than salvage efforts can be mounted despite the dedicated efforts of many libraries, archives, and agencies, such as the Library of Congress and the National Archives and Records Administration;

Whereas the Congress has already appropriated $50,000,000 to the National Archives and Records Administration, $32,000,000 to the Library of Congress, and $2,400,000 to the National Library of Medicine for deacidifying or microfilming books too brittle for ordinary use, and $25,000,000 to the National Endowment for the Humanities for grants to libraries and archives for such purposes;

Whereas nationwide many hundreds of millions of dollars will have to be spent by the Federal, State, and local governments and private institutions to salvage the most essential books and other materials in the libraries and archives of academic and private institutions;

Whereas there is an urgent need to prevent the continuance of the acid paper problem into the indefinite future;

Whereas acid free permanent papers with a life of several hundred years already are being produced at prices competitive with acid papers;

Whereas the American Library Association Council in a resolution dated January 13, 1988, has urged publishers to use acid free permanent papers in books and other publications of enduring use and value, and other professional organizations have expressed similar opinions;

Whereas, some publishers such as the National Historical Publications and Records Commission, the Library of Congress and many university presses are already publishing on acid free permanent papers, and the Office of Technology Assessment has estimated that only 15 to 25 percent of the books currently being published in the United States are printed on such paper;

Whereas even when books are printed on acid free permanent paper this fact is often not make known to libraries by notations in the book or by notations in standard bibliographic listings;

Whereas most Government agencies do not require the use of acid free permanent papers for appropriate Federal records and publications, and associations representing commercial publishers and book printers have thus far not recommended the use of such papers;

Whereas paper manufacturers have stated that a sufficient supply of acid free permanent papers would be produced if publishers would specify the use of such papers; and

Whereas there is currently no statistical information from public or private sources regarding the present volume of production of acid free permenant papers and the volume of production required to meet an increased demand: Now, therefore, be it

Resolved by the Senate and House of Representatives of the United States of America in Congress assembled,

SECTION 1. It is the policy of the United States that Federal Records, books, and publications of enduring value be produced on acid free permanent papers.

SEC. 2. The Congress of the United States urgently recommends the following:

(1) Federal agencies require the use of acid free permanent papers for publications of enduring value produced by the Government Printing Office or produced by Federal grant or contract, using the specifications for such paper established by the Joint Committee on Printing.

(2) Federal agencies require the use of archival quality acid free papers for permanently valuable Federal records and confer with the National Archives and Records Administration on the requirements for paper quality.

(3) American publishers use acid free permanent papers for publications of enduring value, in voluntary compliance with the American National Standard, and note the use of such paper in books, in advertisements, in catalogs, and in standard bibliographic listings.

(4) Reliable statistics be produced by public or private institutions on the present production of acid free permanent papers and the volume of production required to meet the national policy declared in section 1.

(5) The Secretary of State make known the national policy regarding acid free permanent papers to foreign governments and appropriate international agencies since the acid paper problem is worldwide and essential foreign materials being imported by our libraries are printed on acid papers.

SEC. 3. The Librarian of Congress, the Archivist of the United States, the Director of the National Library of Medicine, and the Administrator of the National Library of Agriculture shall jointly monitor the Nation's progress in implementing the national policy declared in section 1 regarding acid free permanent papers and report annually to the Congress regarding such progress by January 1, 1991, and each succeeding year thereafter.

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American Library Association, Washington Office
110 Maryland Avenue, N. E.
Washington, D. C. 20002
202/547-4440

April, 1989

REPORT AND RECOMMENDATIONS TO THE GENERAL ASSEMBLY FROM THE COMMITTEE ON ALKALINE PAPER OF THE CONNECTICUT PRESERVATION TASK FORCE

Report and Recommendations to the General Assembly from the Committee on Alkaline Paper of the Connecticut Preservation Task Force

Connecticut State Library
Hartford, CT
1989

The paper used in this publication meets the minimum requirements of American National Standard for Information Sciences — Permanence of Paper for Printed Library Materials, ANSI Z39.48–1984.

HISTORY AND CHARGE

The Connecticut Preservation Task Force was created by the State Librarian in November 1987 to identify major preservation issues in Connecticut and develop recommendations for action to resolve them. The 1988 regular session of the General Assembly adopted House Joint Resolution No. 44, which directed the Task Force to research the feasibility of, and costs associated with, printing all state publications and official records on alkaline paper, and to report their findings and recommendations for legislation to the General Assembly on or before February 1, 1989. This report is submitted in compliance with that directive.

The State Librarian invited representatives of preservation and historical research interests, the paper industry, the recycling interest, state agencies which participate in the production of state publications, and state agencies concerned with the long term retention of state publications and records to serve on the Committee on Alkaline Paper. The Committee met four times from November 1988 to January 1989, with subgroups conducting meetings and research as interim assignments.

BACKGROUND

The foundation of our free and open society is access to information, both current and historical. That foundation is now being eroded. The documentary record of Connecticut history, culture, and thought, as well as that of the United States and other countries, is disintegrating. Documents and publications that have been carefully collected, cataloged, and kept secure from theft in the State Library, other libraries, and historical institutions in the state and country, are being destroyed from within by the paper on which they are printed. Acid inherent in the raw materials or introduced in the process of manufacturing papers produced since the advent of wood pulp paper production in the 1850's is causing the paper to become brittle and crumble. Many records are already unusable; touching them causes complete disintegration. Other records will be unavailable to future generations unless massive efforts are undertaken now to halt the deterioration.

Millions of dollars have already been allocated at the national level and by individual institutions such as research libraries, to treat this deterioration either by converting publications and records to another medium such as microfilm, or by deacidifying the original copies. Millions more will be needed to continue the preservation effort; even then only the most important of these documents will be salvaged.

What Connecticut's citizens and government do and record today will not be known tomorrow if we continue to use acidic papers for

new publications, and thereby perpetuate the cycle of production, deterioration, and preservation. This costly cycle can be broken by using alkaline, or acid-free, paper that has been shown in tests to last hundreds of years under normal library and archival conditions.

FINDINGS

To determine the feasibility of printing state publications and records on alkaline paper, the Committee explored the availability and cost of alkaline paper, the types of state publications and records that should be created on this "permanent" paper, the processes by which paper for state publications and records are obtained, and the requirements of the state's recycling effort.

Cost and Availability

Alkaline paper is less expensive to produce than acidic paper, so paper mills across the country are converting to an alkaline process at a rapid rate. Approximately 50% of all the writing and printing papers produced today, including bond, cover stock, and other specialty papers, are already alkaline due to this ongoing conversion. It is likely that within the next five years, nearly all writing and printing paper, with the exception of newsprint, will be alkaline. This information, originally obtained at the national meeting of the Technical Association of the Paper and Pulp Industry (TAPPI) in the fall of 1988, was confirmed and enhanced by contacts with current suppliers for bulk purchase of paper under state contract. These paper merchants can, if bidding specifications required it, supply enough alkaline paper to meet the state's demand now.

Since alkaline paper is actually cheaper to produce, the cost of alkaline paper is currently equal to, or less than, the cost of acidic paper. A survey of paper mills conducted by the Permanent Paper Task Force of the National Library of Medicine (APPENDIX I) verified that various kinds and weights of alkaline paper are available at about the same cost per ream as acidic paper. How the paper industry may respond to the increased demand for alkaline paper by publishers, other states, and the federal government is unpredictable, but the state should incur no increased cost by switching to alkaline paper for current use. Changing to alkaline paper over the next few years will ensure the supply for Connecticut even if growing demand temporarily outpaces the mill conversion process.

Publications and Records

The Committee began its study of state publications and records which should be printed on alkaline paper by agreeing upon a definition for "state publications" and "records." "State publications" are defined as "all publications printed or published by, or under, the direction of the state or any officer thereof, or any other agency supported wholly or in part by state funds" (Connecticut General Statutes Sec. 11-9b[a]), including any document of which multiple copies are made. For purposes of this study, "records" are defined as all original records of enduring research value, including all records

designated as "permanent/archival" on retention schedules and all forms filled in by hand or machine. The study concluded with recommendations for specific titles (deemed to be of primary importance to the state's history) and types of state publications and records which should be created on alkaline papers. Together, these publications and records comprise the permanent record of state government activity and the essential records of the citizenry.

Publication Process

State publications are created by a variety of processes after gaining approval from the Office of the Supervisor of State Publications. Many are initiated by an agency which creates bid specifications for outside printers; others are "published" through creating photocopy copies in an agency; still others are printed in-house by agencies. To cover all methods of publication, changes to standard specifications issued by various agencies involved in the publication process will be required.

Some records (as opposed to publications) are created by filling in pre-printed forms; other records include the non-published minutes, etc. of government bodies such as committees and task forces. To ensure the permanence of all types of records created by state government in its daily business, all agencies should use alkaline paper for all forms and for internal paper supplies. Chemicals added to paper to give it "NCR" properties may be acidic; therefore, "NCR" type forms should not be used for permanent records until research determines the effect of this process on alkalinity and permanence. Paper for some records designated as permanent is specified by requirements of the Office of the State Public Records Administrator under General Statutes Sec. 1-9. These specifications should be amended to require alkaline papers that conform to American National Standards Institute standard for *Permanent Paper for Printed Library Materials* (ANSI Z39.48).

Recycling

State recycling legislation calls for state agency purchase and recycling of all types of products including paper. Alkaline paper production is more environmentally sound than acidic paper production since the alkaline process reduces water consumption and facilitates waste management. Therefore changing to alkaline paper for state publications and records is generally supportive of the environmental goal toward which the recycling legislation is aimed. Although recycled alkaline writing and printing paper is produced, only a small amount is currently available, and research on its permanence and durability has not yet been conducted. The writing and printing papers used for publications and records constitute approximately 1.5% of all paper produced; the state could satisfy its recycled paper goals by purchase of paper products from the other 98.5% of paper usage. In the future, if the research does prove the permanence of recycled alkaline papers, then both the

recycling and preservation goals could be met by using such papers. For the present, to ensure their preservation, only alkaline papers that meet ANSI standards should be used for the production of records and publications of enduring value.

CONCLUSIONS

The committee concluded that alkaline paper is available in the necessary quantities and, currently, at no greater cost than acidic paper. Therefore, it is feasible and cost-neutral to require printing all state publications and records on alkaline paper.

Connecticut is a state with a long and rich history and is the repository of some of our country's earliest written records. In our archival and library collections, we hold collections of inestimable value in numerous subject areas. We cannot afford either the ongoing cost to preserve future publications added to these collections, or the incalculable cost of the permanent loss of materials from them. It is fitting that Connecticut be among the small but growing group of states which are taking steps to preserve the country's rich heritage. The passage by the General Assembly of Senate Joint Resolution 10 (APPENDIX IV) in the 1987 session, the creation of the State Librarian's Preservation Task Force, and the legislative directive to research the alkaline paper feasibility study are examples of Connecticut's recognition of, and willingness to address, the preservation issues facing our society.

The Committee on Alkaline Paper of the Connecticut Preservation Task Force therefore advises that the following recommendation and implementation strategies be adopted by legislation or regulation as appropriate.

RECOMMENDATION

As a matter of good public policy relative to preserving the record of state government policy and its implementation, the State of Connecticut should require by legislation that all state publications and records of enduring value and importance to the history and government of the state be created or printed on alkaline paper.

IMPLEMENTATION

Implementation of the Recommendation can be phased in over a three year period to allow adequate time for necessary changes to regulations and procedures. The implementation plan includes a variety of approaches to cover the variety of ways in which state publications and records are produced. These are detailed in Implementation Strategies 1–6.

For action in 1989:
Implementation Strategy 1

- Amend the Bureau of Purchases specifications for purchase of photocopy papers for use by all agencies to require alkaline paper, effective July 1, 1989.

Implementation Strategy 2

- Amend Sec. 1–9 of the Connecticut General Statutes regarding paper for permanent records to require paper that meets or exceeds ANSI standards for permanent paper, effective October 1, 1989.

For action in 1990:

Implementation Strategy 3

- Require Department of Administrative Services Forms Management, and urge Judicial Department Forms Management, to use alkaline paper that meets or exceeds ANSI standards for permanent paper for all forms that become permanent records as designated by records retention schedules issued by the Office of the Public Records Administrator, that are designated for transfer to the State Library, or that are designated by the Judicial Department as permanent.

Implementation Strategy 4

- Require the General Assembly to use alkaline paper that meets or exceeds ANSI standards for permanent paper for all publications issued by the Assembly and its component parts.

For action in 1990–1991:

Implementation Strategy 5

- Add specifications for alkaline paper that meets or exceeds ANSI standards for permanent paper to all applicable DAS/Bureau of Purchases standard specifications, Acceptable Brands Lists (ABL's), and general bid specifications for publications and printing and writing papers. Publicize the revised specifications widely to all state agencies for use in creating their publications in–house.

Implementation Strategy 6

- Require that all bid specifications approved by the Supervisor of State Publications include specifications for alkaline paper that meets or exceeds ANSI standards for permanent paper.

Implementation strategies 5 and 6 can be phased in over the two year period by requiring the following publications and records to be printed on alkaline paper in the successive years:

1990:

Publications

- *State of Connecticut Register and Manual*
- *Digest of Administrative Reports*
- *Records of the State of Connecticut*
- Bound copies of *House and Senate Journals*
- Legislative materials: printed bills, file copies, statutes, Public and Special Acts, and regulations.
- Annual reports of all agencies and agency subdivisions.
- All publications of a serial or periodic nature, including titles in series.

(Note: The Commission on Legal Publications is currently printing all materials on alkaline paper; hence, their exclusion from this list.)

Records

- All records designated as "permanent" and/or "permanent/archival" on records retention schedules issued by the Office of the Public Records Administrator, including pre–printed forms used in the creation of permanent records.
- All records of the Judicial Department designated either in the *Practice Book*, by special agreement, or in regulations, for transfer to the State Library, or designated by the Department as "permanent."

- Records of the General Assembly, including original bills and engrossed copies of bills initially transferred to the Secretary of the State, and all transcripts of joint legislative committee hearings transferred to the State Library.

1991:

Publications

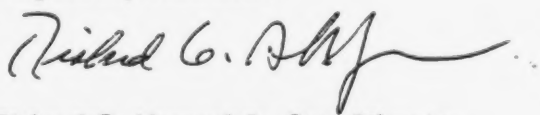
- All General Assembly committee and task force reports.
- All state publications relating to Connecticut historical subject matter.
- All printed maps (excluding photographs).
- All statistical reports.
- All Geological Survey publications.

Records

- All minutes and reports of all commissions and special task forces created by the General Assembly, Governor, or state agencies.

- Bar applications transferred to the State Library by the Connecticut State Bar Examining Committee.

Respectfully submitted,



Richard G. Akeroyd, Jr., State Librarian
Chair, Connecticut Preservation Task Force
Committee on Alkaline Paper

COMMITTEE MEMBERS

Richard G. Akeroyd, Jr., Chair
State Librarian
Connecticut State Library

Peter Bartucca
Records Management Coordinator
Secretary of the State

Harold Block
Sales Representative
Lindenmeyr Munroe Paper Co.

Eunice DiBella
Public Records Management Specialist
Connecticut State Library

Ted A. Faraci
Chief of Standards
Bureau of Purchases
Dept. of Administrative Services

Richard Hemenway
Publications Director
Commission on Official Legal Publications

Mark Jones
State Archivist
Connecticut State Library

Jan Merrill-Oldham
Head, Preservation Department
Homer Babbidge Library
University of Connecticut at Storrs

Lynne Newell
Director of Special Projects
Connecticut State Library

Al Palko
State Documents Librarian
Connecticut State Library

Blanche Reeves
Fiscal Administrative Officer
Secretary of the State

Bruce Stark
Assistant Technical Services Librarian
Beinecke Library
Yale University

Anthony Trouern-Trend
Supervisor of Statute Revision
Legislative Commissioners' Office

Lorraine Whitehead
Supervisor of State Publications
Bureau of Purchases

APPENDIX I

Summary of:
National Library of Medicine Permanent Paper Task Force. Survey of 13 Major Paper manufacturers to Determine Comparative Prices of Acidic vs. Acid Free Papers in Selected Publication Grade Lines. Prices are as of 2/1/88.

TYPE OF PAPER	Average Price ACID MILLS	Average Price ALKALINE MILLS
Coated sheet offset (skids)		
Premium	77.20	77.21
No. 1 — 70#	75.15	74.68
No. 2 — 70#	68.03	68.00
No. 3 — 70#	65.55	65.71
Uncoated sheet offset (skids)		
No. 1 opaque — 50#	62.15	58.00
Commodity opaque — 50#	50.73	53.83
Commodity offset — 50#	46.00	46.00
Coated web offset (rolls)		
No. 1 — 70#	66.15	64.93
No. 2 — 60#	57.33	58.00
No. 3 — 60#	55.50	56.27
No. 4 Groundwood free — 50#	54.83	53.25
No. 5 — 50#	40.21	40.55

APPENDIX II

Reference:
American National Standards Institute. American National Standard for Information Sciences — Permanence of Paper for Printed Library Materials. ©1985. ANSI Z39.48–1984.

APPENDIX III

House Joint Resolution No. 44 (File No. 326)

House of Representatives, April 5, 1988. The Committee on Government Administration and Elections reported through REP. LOONEY, 96th DIST., Chairman of the Committee on the part of the House, that the joint resolution ought to be adopted.

RESOLUTION CONCERNING THE USE OF ALKALINE PAPER FOR THE PRINTING OF ALL STATE OF CONNECTICUT PUBLICATIONS AND OFFICIAL RECORDS.

Resolved by this Assembly:

WHEREAS, extensive research has proven that the acid present in most writing and printing paper produced since the mid–nineteenth century has drastically reduced the life of books, other publications and documents;

WHEREAS, the serious deterioration of the holdings of our libraries and archives has been well documented;

WHEREAS, it will require large expenditures of funds during the next several decades to prevent the deterioration of acidic papers by deacidifying them;

WHEREAS, it will require additional large expenditures during the next several decades to salvage even the most essential materials that have become brittle, by reproducing such materials on microfilm, alkaline paper or some other chemically and physically stable medium;

WHEREAS, the potential loss of a high percentage of the publications and unique records produced over the course of more than a century poses a threat to the continuity of our documentary heritage;

WHEREAS, this problem can be addressed by printing on alkaline paper, which is readily available and which has a prospective life of several hundred years;

WHEREAS, the National Information Standards Organization is writing to all American publishers to urge the use of paper meeting ANSI Standard Z39.48–1984 for the printing of publications of enduring value;

WHEREAS, on October 16, 1987 the Depository Library Council to the Public Printer of the United States, adopted a recommendation that permanent paper be used for Federal government publications of enduring value;

WHEREAS, the American Library Association, on January 13, 1988, adopted a resolution urging (1) publishers to use paper meeting ANSI Standard Z39.48–1984, (2) the United States Congressional Joint Committee on Printing to adopt standards for permanent papers and to encourage agencies of the Federal government to use such paper for publications of enduring value and (3) appropriate agencies of state and local governments to adopt similar policies; and

WHEREAS, this general assembly, in Senate Joint Resolution 10 of the 1987 regular session of the general assembly, endorsed a policy under which certain state agencies shall take necessary action to preserve the state's historical records and supporting the efforts of the state librarian's task force on the preservation of historical records.

NOW, THEREFORE, BE IT RESOLVED, that this general assembly urges the state librarian's task force on the preservation of historical records to (1) research the feasibility of, and costs associated with, printing all state publications and official records on alkaline paper and (2) on or before February 1, 1989, report their findings, including recommendations for legislation, if any, to the general assembly concerning the use of alkaline paper.

Committee Vote: Yea 14 Nay 0

APPENDIX IV

Substitute Senate Joint Resolution No. 10 (File No. 612)

Senate, April 28, 1987. The Committee on Government Administration & Elections reported through Senator Maloney of the 24th District, Chairman of the Committee on the part of the Senate, that the substitute joint resolution ought to be adopted.

RESOLUTION CONCERNING THE PRESERVATION OF THE STATE'S HISTORICAL RECORDS.

Resolved by this Assembly:

WHEREAS, Connecticut's historical records document the state's progress from colonial times to the present; and

WHEREAS, these records have served as an important resource for the development and understanding of the rights and liberties of the citizens of this state, beginning with the Fundamental Orders of 1639; and

WHEREAS, Connecticut has recently celebrated the three hundred fiftieth anniversary of its founding and shall, in 1987, commemorate the role of the state in the drafting and ratification of the federal constitution, which is documented in our state's historical records; and

WHEREAS, the Connecticut state librarian shall be establishing a task force this year, consisting of archivists, historians and librarians, to study and make recommendations for the preservation of the state's priceless historical records for future generations.

NOW, THEREFORE, BE IT RESOLVED, that the general assembly endorses a policy under which the appropriate state agencies shall take necessary action to preserve the state's historical records for public use and supports the efforts of the state librarian's task force on the preservation of historical records.

Committee Vote: Yea 13 Nay 0

* * * * *

The New York Times

Metropolitan News

NEW YORK, NEW JERSEY, CONNECTICUT / WEDNESDAY, MARCH 8, 1989 B1

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Publishers Swear Off Acidic Paper

By ELEANOR BLAU

Dozens of publishers and prominent authors gathered at the New York Public Library yesterday to call attention to a villain turning millions of books to dust: acidic paper.

They signed a statement vowing to use only acid-free paper, if available, "for all first printings of quality hardcover trade books in order to preserve the printed word and safeguard our cultural heritage for future generations."

Acidic paper, used since the middle of the 19th century in the United States and much of the Western world, turns brown and brittle in a few decades.

More paper mills are producing acid-free or alkaline paper, and leaders of the acid-free crusade hope to increase the supply by increasing the demand from publishers and authors who refuse to be published on any other kind.

35 Miles of Shelves Becoming Dust

The consequences of inaction are grim, they say. The New York library alone has 2.5 million disintegrating books — 35 miles of shelves of them — and is spending more than $3 million this year to preserve or microfilm as many as possible.

"I never thought that when I came to the New York Public Library that I would be involved in book triage — determining which books shall live and which shall perish," said Dr. Vartan Gregorian, welcoming the group to what was described as his last public appearance as president of the library.

"You are here as fellow champions of the cause of acid-free paper, which lasts 200 years — some say even 300 years — instead of self-destructing in 30," he said.

Proponents of acid-free paper say that it costs no more to make — and in some cases less — than acidic paper, and that the only real expense is in switching processes. The library said that 25 percent of the printing paper produced in 1988 was acid-free, and that amount should double by next year.

The declaration, printed, of course, on alkaline paper, was signed by about 45 authors, including Tom Wolfe, Kurt Vonnegut Jr., Jill Krementz, Norman Mailer, Barbara Goldsmith, Fran Lebowitz, Nora Ephron, Alfred Kazin, A. R. Gurney Jr., Irving Howe and Arthur M. Schlesinger Jr., and by 35 publishers, including Random House, Simon & Schuster, Harper & Row, McGraw-Hill, Doubleday, Macmillan, Grove Press, W. W. Norton & Company and the Time Inc. Book Company.

Continued on Page B2

A Promise Worth the Paper It's Printed On

Continued From Page B1

John Baker, the library's chief preservation librarian, held a vivid demonstration aloft: a 1925 biography of the composer Palestrina, discolored and falling apart, and a 1482 volume on Euclid's geometry, its pages white, strong and flexible.

In an interview, he traced the start of the problem to the 1850's, when the demands of growing literacy drained supplies of cotton-rag and linen-rag paper, and a way to make paper out of wood pulp was developed.

Lignin in the wood pulp oxidizes and turns brown, he said, and alum-rosin sizing, a chemical added to keep ink from feathering, also discolors the paper. Over time, the alum combines with sulfur dioxide in the atmosphere, making the problem worse.

"It was not generally known to American librarians that the paper was deteriorating fairly rapidly," he said, until they were alerted in the 1960's by William J. Barrow, a self-trained archivist.

By 1966, he said, Mr. Barrow had helped create a wood-pulp process using alkaline chemicals.

The author Barbara Goldsmith, a library trustee who is credited with spearheading the acid-free crusade in the publishing world, dates her interest to a decade ago, when she was doing library research for her book "Little Gloria ... Happy at Last." Materials printed before 1850 were often in good condition, she realized, while those printed later sometimes crumbled under her fingertips.

About three years ago, she said, she called 20 fellow authors and not one knew about the problem. She called publishers who either said they didn't care or wanted proof acid-free paper was comparable in cost.

"So we did three cost studies, the last with their own buyers," she said. "That was the breakthrough study."

The publishers are still nervous, she said, especially about availability — hence the declaration's adjectives. "There are so many qualifiers: 'first printing, quality, hardcover, trade,' she said, "and an asterisk saying 'subject to availability.' This event is a start."

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Association of Research Libraries
1527 New Hampshire Avenue, N.W., Washington, D.C. 20036 (202) 232-2466

ARL Fact Sheet

Mission: To strengthen and extend the capacities of Association members to provide access to recorded knowledge and to foster an environment where learning flourishes, to make scholarly communications more effective, and to influence policies affecting the flow of information.

Membership: 119 research libraries in the United States and Canada.

Founded: 1932

Programs: Current areas of activity include: scholarly communication, building library collections and ensuring widespread availability and access to them, preservation of research library materials, staffing for research libraries, library education, information policy and legislative affairs relating to research libraries and scholarship, and library management and statistics.

Major projects include: the Serials Pricing initiative. the North American Collections Inventory Project, the Government Information in Electronic Format initiative, the National Register of Microform Masters (NRMM) Retrospective Conversion Project, the ARL Statistics Program, the OMS Academic Library Development Program, the OMS Training Program, and the OMS Systems and Procedures Exchange Center.

Officers:

President:	Charles E. Miller, Director of Libraries, Florida State University
Vice President:	Martin Runkle, Director of Libraries University of Chicago
Past President:	Elaine F. Sloan, Vice President & University Librarian, Columbia University
Executive Director:	Duane E. Webster

Office of Management Services:

The ARL Office of Management Services (OMS) was established in 1970 to help research libraries improve their management and service capabilities. OMS conducts research into the organizational problems of academic libraries, develops new management techniques, and offers information services and training.

Director: Jeffrey J. Gardner

(over)

Membership of the Association of Research Libraries

National Libraries:
- Canada Institute for Scientific and Technical Information
- Library of Congress
- National Agricultural Library
- National Library of Canada
- National Library of Medicine

Special Libraries:
- Center for Research Libraries
- Linda Hall Library
- Newberry Library
- Smithsonian Institution Libraries

Public Libraries:
- Boston Public Library
- New York Public Library
- New York State Library

University Libraries:

- Alabama
- Alberta
- Arizona
- Arizona State
- Boston
- Brigham Young
- British Columbia
- Brown
- Calif., Berkeley
- Calif., Davis
- Calif., Irvine
- Calif., Los Angeles
- Calif., Riverside
- Calif., San Diego
- Calif., Santa Barbara
- Case Western Reserve
- Chicago
- Cincinnati
- Colorado
- Colorado State
- Columbia
- Connecticut
- Cornell
- Dartmouth
- Delaware
- Duke
- Emory
- Florida
- Florida State
- Georgetown
- Georgia
- Georgia Inst. of Tech.
- Guelph
- Harvard
- Hawaii
- Houston
- Howard
- Illinois, Chicago
- Illinois, Urbana
- Indiana
- Iowa
- Iowa States
- Johns Hopkins
- Kansas
- Kentucky
- Kent State
- Laval
- Louisiana State
- McGill
- McMaster
- Manitoba
- Maryland
- Massachusetts
- Mass. Inst. of Tech.
- Miami
- Michigan
- Michigan State
- Minnesota
- Missouria
- Nebraska
- New Mexico
- New York
- North Carolina
- North Carolina State
- Northwestern
- Notre Dame
- Ohio State
- Oklahoma
- Oklahoma State
- Oregon
- Pennsylvania
- Pennsylvania State
- Pittsburgh
- Princeton
- Purdue
- Queen's
- Rice
- Rochester
- Rutgers
- Saskatchewan
- South Carolina
- Southern California
- Southern Illinois
- Stanford
- SUNY Albany
- SUNY Buffalo
- SUNY Stony Brook
- Syracuse
- Temple
- Tennessee
- Texas
- Texas A&M
- Toronto
- Tulane
- Utah
- Vanderbilt
- Virginia
- Virginia Poly. Inst.
- Washington
- Washington State
- Washington, St. Louis
- Waterloo
- Wayne State
- Western Ontario
- Wisconsin
- Yale
- York

Commission on
Preservation and Access

1785 Massachusetts Ave., N.W. #313
Washington, D.C. 20036
Telephone: 202/483-7474
FAX: 202/483-6410
BITNET: CPA@GWUVM

Patricia Battin
President

COMMISSION ON PRESERVATION AND ACCESS

Governance: Organized as a public charity under the 501(c)(3) tax-exempt provision of the Internal Revenue Service Code

Billy Frye, Chairman, Millicent Abell, Herbert Bailey, James Govan, Vartan Gregorian, Kenneth Gros Louis, Warren J. Haas, Carole Huxley, Sidney Verba, and William Welsh.

President: Patricia Battin

Staff: Peter Winterble, Program Officer
Pamela Block, Administrative Assistant

Administrative Support: University of California, Berkeley; Columbia University; Harvard University; University of Illinois, Indiana University, University of Michigan, Princeton University, Stanford University, Yale University, the research libraries of the New York State Preservation Program, the Council on Library Resources, the H. W. Wilson Foundation, the William and Flora Hewlett Foundation, the Andrew W. Mellon Foundation, and the Getty Grant Program.

Program Support: The Andrew W. Mellon Foundation and the Getty Grant Program.

Purpose: To foster, develop, and support systematic and purposeful collaboration among all libraries and allied organizations in order to insure the preservation of the published and documentary record in all formats and to provide enhanced access to scholarly information.

Program Directions:

Brittle Books Program

- Coordinated nation-wide preservation filming program with federal, state, local, and corporate support
- Mass deacidification technologies and facilities
- Use of alkaline paper for publications of enduring value

Institutionalization of preservation operations in individual libraries and archives

Establishment of centralized storage and distribution center for cost-effective access to "national collection" of preservation microfilms

Exploration of educational requirements to provide necessary talent for massive reformatting program and institutional operations

Monitoring of new technologies for storage and retrieval applications

Exploration with scholars in appropriate formats and priorities in specific disciplines

Billy Frye
Emory University
Chairman

Herbert Bailey
Princeton University Press (ret.)

Vartan Gregorian
New York Public Library

Warren J. Haas
Council on Library Resources

Sidney Verba
Harvard University

Millicent Abell
Yale University

James Govan
University of North Carolina at Chapel Hill

Kenneth Gros Louis
Indiana University

Carole Huxley
New York State Education Department

William Welsh
Library of Congress

1785 Massachusetts Ave., N.W. #313
Washington, D.C. 20036
Telephone: 202/483-7474
FAX: 202/483-6410
BITNET: CPA@GWUVM
ALANET: ALA2624

Commission on Preservation and Access

1989 Fact Sheet

PURPOSE

To foster, develop, and support systematic and purposeful collaboration among libraries and allied organizations in order to—

ensure the preservation of the published and documentary record in all formats

provide enhanced public access to preserved materials through an open distribution system.

The Commission maintains a small staff and works wherever possible through existing organizations as a source of support and advocacy for cooperative preservation activities.

1989-90 PROGRAM OBJECTIVES

Brittle Books - Endangered materials from the past. A coordinated international and nationwide preservation microfilming program with private and public support.

Published materials now and in the future. The use by scholarly and commercial publishers of alkaline paper for publications of enduring value.

Within individual libraries and archives, the institutionalization of preservation operations.

Exploration of options for a **central storage and distribution center** to provide broad access to preserved materials in a variety of formats.

Investigation into **education and training requirements** needed for operating and working with a large reformatting program.

Assessment of **technologies for mass preservation**, storage, and distribution applications.

Exploration with scholars from specific disciplines of the **appropriate formats and priorities** for preservation microfilming.

PROGRAM SUPPORT

University of California, Berkeley; Columbia University; Harvard University; University of Illinois; Indiana University; University of Michigan; Princeton University; Stanford University; Yale University; the research libraries of the New York State Preservation Program.

The Council on Library Resources, the H.W. Wilson Foundation, the William and Flora Hewlett Foundation, the Andrew W. Mellon Foundation, and the Getty Grant Program.

GOVERNANCE

Commission Members: Billy Frye, Emory University (Chair); Millicent Abell, Yale University; Patricia Battin, President, Commission on Preservation and Access; Herbert Bailey, Princeton University Press (ret.); Richard De Gennaro, New York Public Library; James Govan, University of North Carolina at Chapel Hill; Vartan Gregorian, Brown University; Kenneth Gros Louis, Indiana University; Warren J. Haas, Council on Library Resources; Carole Huxley, New York State Education Department; Sidney Verba, Harvard University; and William Welsh, Library of Congress (ret.).

The Commission is organized as a public charity under the 501(c)(3) tax-exempt provision of the Internal Revenue Service Code.

STAFF

President: Patricia Battin
Program Officer: Maxine K. Sitts
Administrative Assistant: Pamela D. Block

CONSULTANTS

Hans Rutimann
Henry Riecken
Rowland Brown

1989 COMMITTEES

College Libraries Committee
Mid-Sized Libraries Committee
Technology Assessment Advisory Committee
Scholarly Advisory Committees on History, Art History, Philosophy, and Language and Literature

The National Advisory Council on Preservation—composed of representatives from 22 allied organizations committed to preservation—advises the Commission in its work.

The NHA National Humanities Alliance

Overview

The National Humanities Alliance was created in 1981 to unify the public interest in support of Federal programs in the humanities. The Alliance is the only organization that represents the humanities as a whole — scholarly and professional humanities associations, museums, libraries, historical societies, higher education institutions, and state humanities councils. The Alliance also speaks on behalf of the interests of individuals engaged in research, writing, teaching, the media and public presentations of the humanities.

Purpose

According to the NHA by-laws, the purpose of the National Humanities Alliance is to advance the cause of the humanities by promoting the common interests of its members with regard to national policy, programs and legislation that affect the National Endowment for the Humanities and other agencies related to the humanities. NHA carries out this purpose by providing members with timely information, by providing a forum for active members to discuss and develop NHA policy and activities, and by representing all members or groups of members in action to attempt to influence national policy, programs and legislation affecting NEH and other humanities-related agencies.

Organization

The National Humanities Alliance is governed by a twelve-member Board of Directors elected by the entire membership of the Alliance. The NHA President is a member of the Board of Directors and is also elected by the membership. The Board of Directors reflects the breadth of NHA membership and determines policy of the Alliance.

The NHA Director is responsible for the day-to-day administration of the NHA offices and is the principal NHA liaison with Federal legislative and administrative officials.

The NHA publishes a regular newsletter, *The Alliance*, that reports on action in Washington affecting the humanities. Members also receive special alerts when their immediate response is needed to influence federal humanities policy or funding.

The NHA annual meeting is held in April of each year. At the annual meeting, policy matters affecting the Alliance are presented and each organization's representative participates in decision-making.

Membership

NHA membership is open to organizations whose members, institutions or faculty benefit from Federal humanities programs.

1527 New Hampshire Avenue, N.W.
Washington, D.C. 20036

202/328-2121

The NHA National Humanities Alliance

Members of the National Humanities Alliance

American Academy of Religion
American Anthropological Association
American Association for the Advancement of Slavic Studies
American Association of Museums
American Association for State and Local History
American Conference of Academic Deans
American Council of Learned Societies
American Dialect Society
American Folklore Society
American Historical Association
American Library Association
American Musicological Society
American Numismatic Society
American Philological Association
American Philosophical Association
American Political Science Association
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American Society for Eighteenth-Century Studies
American Society for Legal History
American Society for Theatre Research
American Sociological Association
American Studies Association
Association for Asian Studies
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Association of American Geographers
Association of American Law Schools
Association of American University Presses
Association of Research Libraries
College Art Association of America
College English Association
Community College Humanities Association
Federation of State Humanities Councils
George Washington University
History of Science Society
Independent Research Libraries Association
Linguistic Society of America
Medieval Academy of America
Midwest Modern Language Association
Modern Language Association
National Council of Teachers of English
Philological Association of the Pacific Coast
Popular Culture Association
Renaissance Society of America
Shakespeare Association of America
Social Science Research Council
Society for Ethnomusicology
Society for the History of Technology
Society of Biblical Literature
Society of Christian Ethics
South Atlantic Modern Language Association
South Central Modern Language Association
Speech Communication Association
Virginia Center for the Humanities

(September 1988)

1527 New Hampshire Avenue, N.W.
Washington, D.C. 20036